DISSERTATION ON

"STUDY OF RISK OF MALIGNANCY INDEX IN THE PREOPERATIVE EVALUATION OF PATIENTS WITH OVARIAN TUMOR"

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CERTIFICATE

This is to certify that this dissertation **"STUDY OF RISK OF MALIGNANCY INDEX IN THE PREOPERATIVE EVALUATION OF PATIENTS WITH OVARIAN TUMOR"** submitted by **Dr.KIRUTHIKA SELVANAYAKI. V. S.,** appearing for M.D. Degree Branch II Obstetrics & Gynaecology examination in April 2013 is a bonafide record of work done by her under my direct guidance and supervision in partial fulfillment of the regulations of the Tamilnadu Dr. M.G.R Medical University, Chennai. I forward this to the Tamilnadu Dr. M.G.R Medical University, Chennai, Tamilnadu, India.

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DECLARATION

I solemnly declare that this dissertation entitled **"STUDY OF RISK OF MALIGNANCY INDEX IN THE PREOPERATIVE EVALUATION OF PATIENTS WITH OVARIAN TUMOR"** was done by me at Institute of Obstetrics & Gynaecology, Madras Medical College during 2010-2013 under the guidance and supervision of, **Prof.Dr.GEETHA PRASAD MD., DGO**., This dissertation is submitted to the TamilNadu Dr.M.G.R. Medical University towards the partial fulfillment of requirements for the award of M.D. Degree in Obstetrics and Gynaecology (Branch – II).

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CONTENTS

INTRODUCTION

Ovarian cancer is the most lethal tumor of all gynaecological malignancies. It is the fifth most common tumor of women. The case fatality rate is high with ovarian tumor than any other gynaecological malignancies.

Ovarian cancer is often asymptomatic and often present in late stages in which the 5 year survival rate is poor. Hence early diagnosis and appropriate treatment is essential for the better outcome of the patients.

Despite the great advancement in medicine, the prognosis has not changed over periods. This is because of delay in the diagnosis of malignancy.

The 5 year survival rate for stage 1 is 86% and with stage 2 is 19% according to FIGO 2006.The most common clinical symptoms are vague and non specific . Majority of women presents with pelvic masses. Since ovarian cancer is the deadliest tumor, screening and providing appropriate therapy at the earliest possible is of importance.

The suboptimal primary cytoreductive surgery has great prognostic significance. The reason for this is due to inappropriate pre operative evaluation, which dictates the nature of the surgery to be performed and the experience of the surgeons in performing the staging Laparatomy, if indicated. Hence it is important for the gynaecologists to differentiate benign from malignancy in patients presenting with adnexal masses.

Various studies have shown that the diagnosis of ovarian tumor by investigations like Ultrasonagram, Doppler, MRI, CT has been proved to be uncertain despite the need for expertise and they are not cost effective.

In 1990, Jacob et al [18] developed a simple scoring index, Risk of malignancy index based on the menopausal status, ultrasound score and CA 125 value which were obtained preoperatively. They concluded that RMI is very effective in discriminating benign and malignant ovarian mass. Later in 1996, Tingulstad et al [19] modified the RMI and named as RMI 2 and further it was modified as RMI 3 [20] in 1999. Yamamoto et al [24] developed a new RMI and named as RMI 4 in 2009 where he included tumor size score.

The purpose of the present study was to assess the ability of Risk of malignancy index scoring system in differentiating benign and malignant ovarian tumors and to compare the scoring patterns with Histopathological findings.

AIM OF THE STUDY

To evaluate the risk of malignancy index based on CA125, menopausal status and ultrasound score in women with ovarian mass.

To arrive at an optimal cut off point of RMI score.

To evaluate the performance of individual parameters and RMI in differentiating benign and malignant ovarian tumors.

To validate the efficiency of risk of malignancy index in discriminating benign and malignant ovarian tumors

REVIEW OF LITERATURE

The greatest clinical challenge among all gynaecological malignancies is the ovarian cancer. 56 – 60 yrs of age is the peak incidence of ovarian malignancy. 30% of ovarian tumor in postmenopausal women and 7% in premenopausal women were malignant. The ovarian cancer constitutes sixth most common cancer in women and comprises 7.5 % of all gynaecological malignancies and 3.5% of all cancers in general in women.

The incidence is 5.2 per 1,00,000 population.

It was estimated that surgical procedure for a suspected ovarian tumor was performed in 5-10% of women in their life time. Among these, ovarian malignancy has been found in 13-21% of the women. In majority of pelvic masses, 80% are benign and only 20% are frankly malignant. Therefore it is of great importance to discriminate the benign and malignant tumor preoperatively and to reduce the number of surgeries performed in self limiting conditions.

In order to plan whether the ovarian tumor requires minimally invasive procedures or extensive staging procedures, the gynecologist should predict the presence of malignancy preoperatively. In women with adnexal masses, the optimal intervention depends upon the evidence of malignancy.

The ovary is composed of coelomic epithelial layer, germ cell layer and stromal layer. Epithelial lesions account for 80% of the ovarian neoplasms and represent over 90% of ovarian carcinoma. Serous lesion accounts for 70% of epithelial tumors and mucinous 20%, endometroid 2%, clear cell, Brenner and undifferentiated carcinoma each represent less than 1% of epithelial lesions. Serous papillary cystadenocarcinoma is the dominant cell type in malignant tumors. Non epithelial malignancy account for 10% of all ovarian tumors and varies widely with age. The most important factor limiting the diagnostic specificity is the overlap of sonographic features.

In the early stage of malignancy, the majority of women with ovarian mass are asymptomatic, often present with vague and nonspecific symptoms. The presence of vague symptoms, especially in premenopausal women and postmenopausal women like

dyspepsia, early satiety, loss of appetite, urinary urgency and / or frequency, altered bowel habits that are present for less than 1 year duration or their persistence for more than 12 days per month should alert the treating physician. The ovarian mass in the reproductive age group are mostly functional and can be managed conservatively or with minimal invasive procedures. For the ovarian mass occurring in premenopausal women and postmenopausal women, the possibility of malignancy is high and should be properly investigated and the probability of malignancy should be evaluated. A careful history taking regarding the presenting complaints, the nature, onset and progression should be sought. The family history of malignancy such as breast cancer, colon cancer, ovarian cancer should be elicited , as 10% of ovarian tumors runs in families. These familial carcinomas are associated with BRCA gene. Hereditary ovarian cancers are associated with HNPCC, Breast ovarian cancer syndromes.

A careful physical examination is essential to arrive at a clinical diagnosis. If there is any suspicion of pelvic masses, imaging studies are advocated. The Ultrasonagram is the preliminary study in patients with pelvic adnexal masses. Ultrasonagram is more commonly used to differentiate between benign and malignant ovarian tumor. The

ultrasonographic feature that are suggestive of malignancy are the following.

1. Multiloculated lesion
2. Bilateral lesion
3. Ovarian volume more than $10cm^3$
4. Septal thickness more than 2mm
5. Cyst wall thickness more than 3mm
6. Solid component / complex mass (Solid & Cystic)
7. Papillary excrescences
8. Increase in vascularity
9. Doppler resistance index less than 0.40 (RI < 0.40)
10. Presence of ascites
11. Presence of intrabdominal metastasis

The sensitivity of USG is high but the specificity is low for diagnosis of early ovarian malignancy.

In 1993, Granberg et al [46] proposed a morphological classification based of ultrasonography. The percentage of malignancy in unilocular cyst was 0.3%, unilocular cyst with solid component was 7%, multilocular lesion was 36% and solid tumor was 39%.

In 1991, Sassone et al [7] developed a scoring system based on the ultrasonographic features like structure of internal wall, thickness of the wall, the presence of septations and echogenicity.

De Priest et al[57], 1993 combined tumor volume, wall structure and septal structure. In a study of 121 sonogram of patients with ovarian mass , they found that 80 patients with ovarian tumor with a score of less than 5 were benign.

In 1995, Botta and Zarcone compared the diagnostic accuracy of the Sassone [7] and De priest[57] scoring systems. They found that cut off value of 9 in Sassone[7] scoring system and cut off value of 5 in De priest[57] score has a large number of false positive results. There were considerable overlap in their scores of benign and malignant tumors. They concluded that the accuracy of scoring system was not improved by the addition of ovarian volume as a criteria.

Ferrazzi et al (1997) [45] in a prospective comparison of the morphological scoring system, a new multicenter score demonstrated a statistically significant diagnostic accuracy. This was due to addition of two new criteria that allowed correction for typical dermoids and

endohaemorrhagic corpora lutea. The scores were sensitive but not specific with the best diagnostic accuracy of 72% obtained with a sensitivity 87% and specificity 67%. This study gave better result than other previous scoring system (Sassone et al 1991[7], Granberg et al[46] 1993 etc) in predicting the malignancy.

None of these scoring systems have very high accuracy. The parameter used in different ultrasonography morphological scoring system needs specific expertise skills of the sonologist.

CA 125 is the most commonly used tumor marker in screening of high risk patients with ovarian tumor. CA 125 also called as cancer Antigen 125, was so named because it was the 125th antibody found while testing various antibodies against ovarian tumor. Normal level is 0-35 U/ml. CA 125 was first described by Bast and collegues in 1983.

CA 125 is produced in low quantities by normal ovarian epithelial cells, peritoneal lining cells, lining cells of GIT, pancreas, breast and lung. Thus an elevated level of CA 125 is not very specific.

High levels of CA 125 are frequently associated with ovarian malignancy. However due to low sensitivity and specificity, CA 125 was not useful as a screening method.

CA 125 is found to be elevated besides in ovarian malignancy like breast cancer, lung cancer, GIT Carcinomas, pancreatic cancer, Endometrial cancer, fallopian tube cancer etc. The benign conditions associated with elevated CA 125 levels are endometriosis, fibroid uterus, Pelvic inflammatory disease, menstruation, Pregnancy, ectopic pregnancy and other non gynecological conditions like peritonitis, diverticulitis, inflammatory bowel disease, tuberculosis, liver disease, recent surgery etc.

The low specificity of CA 125 values demonstrates that CA 125 is not specific for ovarian cancer especially in reproductive age, where the various benign conditions associated with elevated CA 125 levels are more common. Hence the cut off value of CA 125 in postmenopausal women in predicting malignancy is 35U/ml whereas in premenopausal women, the cut off value upto 200 U/ml is not very predictive.

The sensitivity of the CA 125 value was limited in early stage of the malignancy. Also not all malignant ovarian cancer was associated with elevated CA 125 levels thus lowering the sensitivity of the CA 125.

Serum CA 125 levels are measured in the blood by second generation test. Due to poor sensitivity and specificity, CA 125 values are not useful in screening the general population. However high risk women should be subjected to CA 125 test.

CA 125 is very useful in detecting the treatment outcome in women with ovarian cancer. Serial CA 125 test predicts the recurrence of ovarian tumor at the earliest. Also CA 125 has a role in predicting the treatment effectiveness of patients with ovarian cancer undergoing chemotherapy.

The various other tumor markers that can used for screening of ovarian cancer are CA 19-9, CA 15-3, lipid associated sialic acid, osteopontin etc., None of these tumor marker have diagnostic potential.

A new approach in the diagnosis of ovarian cancer is the proteomic pattern which detects the proteins & protein fragments circulating in the blood. The sensitivity of proteomic pattern is 100% and specificity is 95% with positive predictive value of 94%. But its efficacy and the validation is yet to be studied in large population.

Genetic testing is advocated in women with family history of epithelial ovarian cancer.

There are numerous investigational modalities that are being used and studied. None of them proved to be a best in differentiating benign and malignant ovarian tumors. Hence was introduced a multimodal screening modalities, which combines various parameters to improve the sensitivity and specificity of the test in predicting the presence of malignancy.

In 1990, Jacob et al [18] developed a new scoring system called Risk of Malignancy index (RMI). RMI is based on the following 3 parameters.

1) Serum CA 125 level (U/ml)

2) Ultrasound score. The various parameters are multilocular cyst, presence of solid mass, bilateral lesions, evidence of metastasis, presence of ascites. Each parameter is given 1 point. The ultrasound score (U) of O is given if the total point is O, score of 1 if the total point is 1 and score of 3 if the total point is between 2-5.
3) The menopausal status (M) M=1 if premenopausal and M-3 if postmenopausal.

RMI is calculated with these 3 criteria. It is the product of CA 125 level (absolute value U/ml), menopausal score and ultrasound score. It is expressed as,

$$RMI = U \times M \times CA\ 125$$

Using RMI cut off level of 200, the sensitivity is reported as 85% and specificity as 97% for diagnosing ovarian cancer.

In 1993, Davis et al [22] performed a study on 124 patients to validity the Risk of malignancy index. The study confirmed that the RMI is more appropriate in differentiating benign and malignant tumor than the individual criteria and the results were compared with the other scoring systems. In this study, the sensitivity of RMI was

87% and specificity was 89%. It was concluded that RMI is a simple scoring system that can be employed in clinical practice for discriminating begin ovarian mass from malignant lesion and provides an opportunity for appropriate selection of cases that can be referred to tertiary centre, where appropriate surgery by expert surgeons are available.

Tingulstad et al[19] in 1996 modified the risk of malignancy index proposed by Jacob et al [18] in 1990 now called as RMI 1. The RMI 2 of Tingulstad et al [19] was calculated based on the same parameters as Jacob et al [18] but the scoring value was altered.

1. CA 125 level (value in U/ml)
2. menopausal score M (M=1 if premenopausal but M = 4 if postmenopausal)
3. Ultrasound score U (based on 5 USG features like bilateral lesion, multiloculation, solid lesion, ascites and extra ovarian metastasis. Each parameters were given 1 point and U=1 if the points were 0 or 1 and U = 4 if two or more parameters were present).

RMI is the product of CA 125, Ultrasound score and menopausal status. The sensitivity of RMI 2 was 71%, specificity was 96%, positive predictive value was 89% and negative predictive value was 88%. They concluded that RMI 2 has better performance than RMI 1 and recommended that RMI 2 is better than RMI 1 in discriminating benign and malignant ovarian tumors.

In 1999, Tingulstad et al [20] further modified RMI 2 previously modified from RMI 1 by altering the scoring values and it is now termed as RMI 3. The RMI 3 is the product of ultrasound score, CA 125 value and menopausal status but the scoring is different from RMI 1 and RMI 2. The CA 125 value is the absolute value. The menopausal score is like RMI 2, that is M=1 if premenopausal and M=3 if postmenopausal. The ultrasound score U is based on the same five criteria like bilateral lesion, multiloculations, presence of solid areas, ascites and intra abdominal metastasis. U=1 if no or one criteria is present and U=3 if two or more criteria is present.

The study was conducted in 365 patients with a cut off value of 200, the sensitivity of RMI 3 was 71.1%, specificity was 92%, positive predictive value was 69% and negative predictive value was

92%. They concluded that RMI 3 has high sensitivity and specificity in diagnosing ovarian cancer. They reported that RMI scoring system had better performance than individual parameter in discriminating ovarian tumor as benign or malignant.

In 1999, Morgante et al [23] tested these RMI indices in 124 patients with ovarian mass and showed that risk of malignancy index was a simple scoring system that are clinically applicable and aids in discriminating benign from malignant ovarian mass. They compared RMI 1 and 2 and found that RMI has better performance in detecting malignancy than individual criteria.

Risk of malignancy index was further modified by Yamomoto et al [24] in 2009. They introduced new criteria in RMI score. It is the tumor size score. According to them, RMI 4 is the product of CA 125 level, ultrasound score, and menopausal status and tumor size score.

RMI 4 = CA 125 x U x M x S.

Where, CA 125 level – the absolute value in U/ml

U is the ultrasound score based on the 5 parameters- bilateral lesions, multilocularity, solid areas, ascites and extra ovarian tumor.

U=1 if no or one parameter is present and U = 4 if 2 or more parameter is present.

S corresponds to tumor size score. Where S =1, if tumor size is less than 7 cm in a single largest diameter and S=2 if tumor size is 7 cm or more. The study showed that inclusion of tumor size score improved the efficiency of the RMI to diagnose malignancy. They compared the four malignancy indices and showed that RMI 4 has better sensitivity and specificity in differentiating malignant and benign ovarian tumors. They showed that while using RMI 4, the cut of value is 450. The sensitivity of RMI 4 was 86.8%, specificity was 91%, positive predictive value was 97.5% and negative predictive value was 90%. Thus they concluded that RMI 4 was better than RMI 1, 2 and 3.

There are four risk of malignancy index scoring system.

	Parameters	RMI 1	RMI 2	RMI 3	RMI 4
1.	CA 125	U/ml	U/ml	U/ml	U/ml
2.	Menopausal Status - Premenopausal - Postmenopausal	1 3	1 4	1 3	1 4
3.	Ultrasonogram score If no parameter present If 1 parameter If 2 or more parameters	U = 0 U = 1 U = 3	U=1 U=1 U=4	U=1 U=1 U=3	U=1 U-1 U=4
4.	Tumor size score size <7cm size >7cm	- -	- -	- -	S = 1 S = 2

In 2001, Manjunath et al [25] conducted a study that compared the ability of Risk of Malignancy indices RMI 1, 2 and RMI 3 in discriminating benign and malignant ovarian tumor. The study showed that there was no statistical difference in all three RMI indices in differentiating benign and malignant ovarian tumors. They concluded that diagnostic performance of the RMI indices RMI 1, RMI 2 and RM1 3 were reliable.

Twickler et al [17] in 1999 devised "The Ovarian Tumor index' to predict the risk for malignancy. They studied 244 women, 214 had benign lesions and 30 had malignant lesions. They concluded that by combining various parameters like age in years, ovarian volume, Sassone`s[7] morphology score, PI, central or septal location, peripheral location and echogenicity, the ovarian tumor index is found to be accurate in predicting the ovarian malignancy. Torres et al[56] (2002) conducted a study on 158 patients with ovarian mass and showed that the sensitivity of RMI calculated was 73% and had a specificity of 86%.

Ma et al (2003) performed a study on 140 patients to evaluate the Risk of Malignancy index preoperatively in women with pelvic

mass. The sensitivity of the RMI studied was 87.3%, specificity was 84.4%, positive predictive value was 82.17% and negative predictive value was 89%. They concluded that, there was no statistically significant difference among RMI 1, 2, 3 in differentiating benign and malignant ovarian tumor and showed that RMI is reliable in predicting malignancy in preoperative evaluation of ovarian tumor.

In 2003, Anderson et al [27] demonstrated the ability of RMI in discriminating benign and malignant ovarian tumor among 180 patients. The sensitivity of RMI with cut off value 200 was 70.6%, the specificity was 87.7%, positive predictive value was 66.1% and negative predictive value was 89.8%.

Obeidat et al [40] (2004) performed a study to analyse the validity of RMI in 100 women with ovarian mass. The RMI scoring system with a cut off value of 200 showed the sensitivity to be 90%, specificity 89%, positive predictive value 96% and negative predictive value 78%. They showed that RMI is a suitable scoring index.

In 2005, Leelahakorn et al [47] evaluated 175 women with pelvic adnexal masses. The RMI was calculated preoperatively and was confirmed with histopathology post operatively. With a cut off value of 200, the sensitivity, specificity, positive predictive value and negative predictive value of the RMI were 88.6%, 90.7% 70.5% and 97% respectively. In this study, the Ultrasound scoring system of Ferrazzi et al [45] was used in the calculation of RMI. They concluded that RMI is a simple, reliable scoring method.

Ulusoy et al [49] (2007) assessed 296 patients with RMI. The cut off value for RMI was 200. The sensitivity was 71.7% specificity was 80.5%, the positive predictive value was 67.3% and negative predictive value was 83.6%. With a cut off value of 153 the diagnostic rate of RMI was 79.4%.

In 2010, van den Akker et al [31] conducted a study in Gynaecologic oncology in 548 patients to evaluate the RMI in daily basis. They showed with a cut off value of 200, RMI had a sensitivity of 81%, specificity 85%, positive predictive value 48% and negative predictive value 96%. They concluded that RMI is a simple scoring

system in diagnosing ovarian cancer during the preoperative evaluation.

Rachmasari Putri et al (2010) analysed 90 patients retrospectively and calculated the Risk of Malignancy index score. 70 patients had malignancy and 20 patients had benign tumors. The sensitivity of RMI in the study was 70%, specificity 75%, positive predictive value 90.74% and negative predictive value 41.67%, when the cut off value of RMI was 200. They concluded that RMI is very useful method in diagnosing malignancy.

In 2011, Milan Terzic et al evaluate the ability of RMI scoring system to detect malignancy. The study involved 81 patients, out of which 51 had benign tumors and 30 had malignancy. With a cut off value of RMI 200, the sensitivity was 83.33%, specificity was 94.12%, positive predictive value was 89.29% and negative predictive value was 90.57%.

Monirath Hav et al [60] (2011) studied the effectiveness of RMI in primary evaluation of patients with adnexal masses. 151 patients were included in the study. 132 patients were diagnosed to have

benign mass and 19 were diagnosed to have malignant mass. The study showed that the best cut off value of RMI 3 was 238 at which the performance of RMI was good. The sensitivity was 89.5%, specificity was 96.2%, the positive predictive value was 77.3% and negative predictive value was 98.4%.

In 2011, Bouzari Z et al studied the RMI Scoring in 182 patients to evaluate its ability to diagnose malignancy in patients with ovarian mass. The study showed at a cut off value of 200, the sensitivity, specificity positive predictive value and negative predictive value of the RMI were 91.3%, 88%, 52% and 98.5% respectively. They concluded that the sensitivity, specificity, positive predictive value and negative predictive value was high at a cut-off point of 265 in differentiating benign and malignant ovarian tumors. The cut-off point of 265 for the RMI was based on the Receiver operating characteristic curve evaluation at which the sensitivity was 91.3% and specificity was 96.2%.

In 2012, Erfan Akturk[11] et al conducted a study to compare the ability of the four risk malignancy indices RMI 1, RMI 2, RMI 3 and RMI 4. The study included 100 patients with ovarian mass. They

proposed that performance of RMI 1, RMI 2 and RMI 3 at a cut off value of 200 and RMI 4 at the cut off value of 500 had better performance and there was no statistical difference. The sensitivity, specificity, positive predictive value, negative predictive value of RMI 1, RMI 2, RMI 3, RMI 4 were obtained and there was no statistical difference and their diagnostic performance were same. They concluded that RMI was a simple index and any of the four RMI indices can be used even in unspecialised units. RMI is most useful diagnostic index in proper selection of patients who require referral to tertiary centres, and also differentiates benign disease that needs conservative line of management or minimal invasive procedures, thus aiding in the reduction of unnecessary surgical exploration of patient with benign diseases. The study showed that in preoperative evaluation of patients with ovarian tumor, the RMI should be the test of choice in discriminating benign and malignancy conditions.

Wang et al [11] (2012) studied an improved risk of malignancy index on 180 women with ovarian tumor. He modified the RMI developed by Jacob et al [18] by introducing colour doppler study and new tumor marker (Tumor specific growth factor). He redesigned the RMI by including ultrasound sound score, Tumor specific growth

factor levels and colour doppler flow imaging result and calculated the improved RMI. The study concluded that improved RMI has high sensitivity, specificity, positive predictive value and negative predictive value when compared to RMI. The study showed that Improved RMI has better performance than the RMI of Jacob et al [18] in differentiating benign from malignant ovarian tumor. He showed that, in comparison of classic Jacob's model the improved RMI was accurate in predicting germ cell tumor, granulosa cell tumor and ovarian malignancies in early stage. Thus with invention of sophisticated doppler methods which requires high level of expertise in ultrasonogram may be applicable in tertiary centre.

In 2012, Hakansson F et al conducted a prospective observational study in the tertiary oncology centre including 1159 patients with pelvic masses. The main objective of the study was to recalculate the RMI at tertiary centre and to assess the diagnostic ability of RMI with cut off value of 200 for preoperative diagnosis of ovarian cancer. The sensitivity of the RMI was 92% and specificity was 82%, positive predictive value was 62% and negative predictive value was 97%. Based on the study, he concluded that Risk of malignancy index has high diagnostic performance in differentiating

benign and malignancy tumor which enable the malignant patients to further preoperative investigations if needed.

The adnexa refer to the ovaries and fallopian tubes. The human female gonads are the ovaries. The site of location of ovaries is on either side of uterine cornua attached to uterus by means of ovarian ligament. The blood vessels and nerves reach ovaries via the Infundibulopelvic ligaments which extend from ovary to the lateral pelvic wall. They are also known as suspensory ligament of ovary. The ovaries are attached to the broad ligament via the meso ovarium.

The cut section of ovary shows outer cortex and inner medulla. The outer cortex has a specialised stroma and the follicles. It is lined by cuboidal surface epithelium derived from mesothelium of ovary. The ovarian medulla is composed of blood vessels and fibro muscular layer.

The ovary is pearly white in colour due to the presence of tunica albuginea. Before menopause, each ovary measures about 3.5 X 2 X 1.5 cm. In early menopause, the dimensions of each ovary is 2 X 1.5 X 0.5 cm whereas in late menopause it measure about 1.5 X 0.75 X 5 cm.

Each ovary is supplied by ovarian artery, a branch of abdominal aorta and ovarian branch of uterine arteries. The veins follow their respective arteries. The right ovarian vein drains into IVC and left vein drains into the left renal vein.

The lymphatic's of ovary follow the artery and drains into the paraaortic lymph nodes. The nerve supply is from the extension of renal plexus.

The main function of the ovary is releasing of ovum during reproductive age and production of sex hormones namely estrogen and progesterone.

In XX fetus, genital ridge develop on 5^{th} week after fertilisation and primordial germ cell follicles are formed in the yolk sac. They migrate towards the genital ridge around 6^{th} week of intrauterine life along the mesentery of hindgut. The genital ridge is formed from coelomic epithelium which differentiates into the pregranular cells. These cells surround the germ cells and are arranged in the ovarian cortex.

After menopause, the ovary shrinks and is reduced in size and volume. The tunica albugenia thickens. In early menopause the volume is 8 ml whereas in late menopause the volume is less than 2 ml.

Due to the complexity in the development, the embryology and histology, the ovary is potential to develop malignancy. Due to its anatomic location deep in pelvis it is not easily accessible clinically for any screening procedures.

The ovarian tumors can arise from epithelial cells, germ cells, stromal cells and connective tissue. About 80% of ovarian tumors are epithelial in origin. Among epithelial tumors, 80% are benign and 20% are malignant. Among malignant ovarian tumors, 90% are epithelial in origin. Also malignant ovarian neoplasms are primary tumor in 80% of cases and in 20%, they are secondary from GIT, breast and colon.

The classification of ovarian tumor (benign and malignant) is devised by WHO and are broadly classified into Nine groups.

WHO CLASSIFICATION OF OVARIAN TUMORS

I Epithelial tumors

1. Serous tumor
2. Mucinous tumor
3. Endometroid tumor
4. Clear cell tumor
5. Brenner tumor
6. Mixed epithelial tumors
7. Undifferentiated Carcinoma
8. Unclassified epithelial tumors.

II Germ cell tumors

1. Dysgerminoma
2. Endodermal sinus tumor
3. Embryonal carcinoma
4. Polyembroyoma
5. Choriocarcinoma
6. Teratoma
7. mixed forms

III Lipid (Lipoid) cell tumors

IV Sex cord (Stromal) tumors

1. Granulosa cell tumor
2. Theca cell tumor
3. Androblastomas: Sertoli leydig cell tumors
4. Gynandroblastomas
5. Unclassified.

V. Gonadoblastomas

1. Pure

2. Mixed with dysgerminoma or other germ cell tumors

VI Soft tissue tumors not specific to ovary

VII Unclassified tumors

VIII Secondary (metastatic) tumors

IX Tumor like conditions

The epithelial ovarian tumors arise from the mesothelial cell derived epithelial cells lining the surface of the ovary. They constitute 80% of total ovarian tumors and 90% of malignant ovarian cancer. The most common epithelial tumor is papillary serous cystadenoma

and cystadenocarcinoma which accounts for 50% of the epithelial tumors.

Borderline Ovarian Tumor:

It was first described by Taylor in 1927. It is also known as ovarian epithelial tumor of low malignant potential. Borderline tumor belongs neither to benign nor to malignant group and hence they are intermediate. Around 10-20% of epithelial tumors are borderline tumor. The borderline tumor shows cellular atypia, pseudo stratification, minimal mitotic activity (<4/HPF), papillary tufting.

There is no stromal invasion which differentiates Borderline from frank malignancy. The characteristic feature that is peculiar to Borderline tumor is that the patient has high survival rate as the disease follows indolent growth. Borderline tumor is diagnosed only on histopathological examination after studying multiple sections.

Serous Tumors:

These are the most common epithelial ovarian tumor constituting 50% of all epithelial tumors. About 60-70% are benign and 20-25% are frankly malignant and 15% are borderline. These tumors are cystic tumors, which are uniloculated or multiloculated contained clear straw coloured fluid. Papillary projections are presented in benign and coarse papillary growths are seen in papillary serous cystadenocarcinoma which is the commonest serous malignant tumor. The tumor is lined by tall columnar cells resembling the endosalphinx. Around 80% of benign serous tumors are potential for secondary malignant change.

Mucinous tumor:

They constitute 15-25% of epithelial tumor. They are mostly unilateral and usually multiloculated cystic tumor. They grow to a large size reaching up to 30cm. The cyst wall is smooth and filled with thick mucinous fluid. These tumors may weigh as much 5-10kg. The cyst is lined by columnar mucin secreting epithelium that resembles the lining of endocervix. The most of these tumors are benign.10-15% are borderline and only 5-10% constitute the malignant counterpart

Pseudomyxoma peritonei, results when the tumor ruptures and leads to dense adhesions.

Endometroid tumors:

These are mostly solid tumor with cystic spaces lined by glandular epithelium which resembles the lining of the endometrium. Most of these tumors are malignant. They constitute for 20% of ovarian cancer. Endometriosis coexists in 15% cases whereas endometrial carcinoma coexists in 20% cases.

Clear cell tumor:

It is also known as mesonephroid tumor. It is a rare tumor lined by large cuboidal epithelial cells resembling the mullerian derivatives. The characteristic feature of this highly malignant tumor is the presence of hobnail cells.

Brenner tumor:

This is also known as transitional cell tumor. It is a rare tumor accounting for 2-3% of epithelial tumors. The tumor is mostly solid and is composed of transition cells and fibrous stoma. It is

characterised by the presence of “Walthard cell nests” The cells have puffed wheat appearance due to the presence of longitudinal groove. They are usually small in size. It is usually associated with mucinous tumor. Occasionally, pseudomeig syndrome presents with Brenner.

Germ Cell Tumors:

They comprise around 15-20% of all ovarian tumors. Dermoid cyst or benign cystic teratoma accounts for 95% of germ cell tumors. Malignant germ cell tumors are more common in the first and second decade of life.

Teratoma:

They arise from embryonic cell. They are of three types

1) Mature teratoma (dermoid Cyst) – Benign
2) Immature teratoma – Malignant
3) Monodermal highly specialised tumor – struma ovarii

Benign cystic teratoma:

Benign cystic teratoma is also known dermoid cyst. It is the most common germ cell tumor occurring at all ages. It is usually unilateral and often asymptomatic. They are composed of cells of all three germ layers namely ectoderm, mesoderm and endoderm of which ectoderm cells predominate. They are cystic lesion with solid component. They are mostly filled with sebaceous material and inner wall shows hair, bone, teeth, cartilage etc derived from various germ layers. Embryonic node or focus is found in the inner wall. Ultrasonogram shows cystic mass with solid components. 1.7% of dermoid cysts can develop in to epidermal tumor. Sarcomatous change is very rare.

Immature teratoma:

They constitute the second most common germ cell tumor. It is mostly unilateral. They are grossly large, lobulated or rounded mass. The microscopic picture shows variety of tissues including muscle tissue, intestinal mucosal cells, brain tissue, hair, sebaceous material etc. The neuroectoderm cells predominate and grading is based on immature neural element. Embryoma is defined as immature teratoma

which had a recognisable form of fetus. Sarcoma is more common and most of immature teratoma is malignant.

Struma Ovarii :

They are the monodermal specialised tissue consisting of thyroid tissue. 5-8% of patients with struma ovarii have hyperthyroidism. The majority of the tumor consists of thyroid cells which would have developed at the expense of other tissues. Most commonly these tumors are benign but malignant transformation of thyroid cells resembling malignant thyroid tumor is possible.

Carcinoid:

It is another type of monodermal specialised tumor which is either primary or secondary. It is also known as Argentaffinoma. It is capable of secreting 5 hydroxy tryptamine which causes flushing and cyanosis.

Dysgerminoma:

Dysgerminoma is the most common malignant germ cell tumor occurring in younger age group. They correspond to seminoma of testis. They are unilateral in most case and 15% cases are bilateral.

They are solid tumor composed of clear round cells. They secrete placental lactogen, Lactate dehydrogenase and B-HCG. They do not secrete sex hormones. Clear round cells with lymphocytic infiltration are characteristic feature of dysgerminoma. Dysgenetic gonad is notorious for the occurrence of dysgerminoma. Around 70% of these tumor are diagnosed early in stage 1. These tumors are highly radio sensitive. But due to their occurrence in younger age, radiation therapy damages the other ovary and questions the future fertility. They are usually conservatively managed by surgical methods, followed by chemotherapy if needed.

Endodermal sinus tumor:

They are known as Yolk sac tumor. They are the second most common germ cell tumor. They are highly malignant tumor occurring in young children. They commonly present with pain abdomen and / or distension. It is a rapidly growing tumor arising from multipotential embryonal tissue. The yolk sac tumor secretes alphafetoprotein and alpha–1 antitrypsin. These are used as tumor markers and can be stained by immunoperoxidase technique. Though they are highly malignant with rapid growth, they are sensitive to chemotherapy.

Embryonal cell carcinoma:

Embryonal cell carcinoma is a highly malignant but rare form of germ cell tumor. The tumor secretes alphafetoprotein and chorionic gonodotrophin. It is most common in prepubertal age group. It presents with various symptoms like precocious puberty and menstrual irregularity.

Choriocarcinoma:

Ovarian choriocarcinoma is very rare form of germ cell tumor. It is highly malignant with early widespread metastasis. The tumor elaborates HCG which is an ideal tumor marker. It is very rare in pure form, but can be seen in mixed forms. Unlike gestational choriocarcinoma, ovarian choriocarcinoma are not very much responsive to chemotherapy.

Mixed Germ Cell Tumor:

Mixed germ cell tumor as name implies consists of two or more germ cell tumor. More than half of these tumor turns malignant.

Sex Cord Stromal Tumor:

Sex cord stromal tumor arise from the sex cord, before they differentiate into male / female or from the ovarian stroma. They are

also known as mesenchymoma. These tumors are mostly functional, exerting feminising effect or virilizing effect based on the presence of female or male elements.

Granulosa cell tumor:

It accounts for 2% of ovarian tumor. Granulosa cell tumor is the most common sex cord stromal tumor. It is a very slow growing tumor. It is a feminising tumor capable of producing estrogen. It arises from the granulosa cells that are not used in the formation of graffian follicle. Granulosa cell tumor can occur at any age and presenting symptom is based on the age of occurance of the granulosa cell tumor. Around 5% of Granulosa cell tumor occur in prepubertal age group. They present with precocious puberty with development of secondary sexual characters like breast development, pubic hair, axillary hair development and menstruation. These patients are treated with unilateral salphingoopherectomy. Adult type Granulosa cell tumor, if occur in the child bearing age group they develop symptoms of abnormal uterine bleeding resembling metropathia hemorrhagica with development of cystic glandular hyperplasia secondary to excess estrogen. In postmenopausal women, granulosa cell tumor most

commonly presents with postmenopausal bleeding secondary to endometrial hyperplasia. 10-12% of women with granulosa cell tumor had concurrent endometrial carcinoma. The tumor is smooth lobulated , variable in size with cystic and solid components. On cut section due to lipid content it is yellow or orange in colour. Microscopically, the cells resemble granulosa cells with characteristic formation of Call Exner body. Other pathognomonic feature of Granulosa cell tumor is the presence of coffee bean appearance.

The tumor cells are capable of secreting Inhibin which can be used as a tumor marker. The tumor after removal, are known for late recurrence. The peculiarity of the metastasis is that it first spreads to opposite ovary followed by lumbar region. The secondary metastasis deposit later develop in the liver, mesentry and the mediastinum. In around 20% of patients with feminisinig tumor, Endometrial carcinoma develops.

Theca cell tumor:

Theca cell tumor is a rare sex cord stromal tumor. Thecoma classically affects postmenopausal women, who presents with

postmenopausal bleeding due to excess estrogen production. These patients are prone to develop endometrial hyperplasia and often have endometrial carcinoma. Thecoma is usually unilateral and cut section show lipid deposits. It resembles fibroma externally. Total abdominal hysterectomy with bilateral salphingoopherectomy is the treatment of choice in postmenopausal women.

Arrhenoblastoma:

These are rare ovarian tumors. They are virilising mesenchymoma which secretes androgens and causing defeminisation and further producing masculinization. The women affected with arrhenoblastoma typically in child bearing age group develops alteration in body contour, flattening of breast, irregularity of menstrual flow resulting in amenorrhea. Later, when excess of androgens are secreted they develop cliteromegaly, hirsutism, coarsening of feature and finally with breakup of voice. The tumor is usually unilateral. The malignant potential is high with virilising tumor. Microscopically, the tumor shows seminiferous tubules. Clinically the endocrine behavior of the tumor clinches the diagnosis.

Gynandroblastoma:

The Gynandroblastoma typically has the characteristic of both Granulosa cell tumor and arrhenoblastoma combined together. It is very rare in occurrence. It is usually benign.

Gonadoblastoma:

It is a very rare tumor which consists of gonadal stromal cells and germ cells. More than half of the patients with Gonadoblastomas has dysgerminoma.

Ovarian Fibroma:

It is the most common tumor arising from the ovarian connective tissue. Ovarian fibroma accounts for 3% of ovarian neoplasms. They grow to a large size about 15cm in diameter and weighs as much as 25kg. The tumor is notorious for cystic degeneration. The ovarian fibroma is harder than uterine fibroid. It is encapsulated with dilated veins over the capsule. Histology shows spindle shaped cells which closely resembles the ovarian cortex spindle cells. Ovarian fibroma is usually commonly associated with Brenner tumor. Ovarian fibroma is usually accompanied by ascites and sometimes with right sided pleural effusion. Such a combination

of ovarian fibroma, right sided peural effusion and ascites is known as meigs syndrome.

Metastastic (Secondary) carcinoma of Ovary:

Around 20% of ovarian cancers are secondary carcinoma with primary elsewhere in the body. The most common primary sites are Gastrointestinal tract especially pylorus, colon, gall bladder, pancreas, breast, uterus and cervix. There are two types of secondary carcinoma of the ovary. In the first type, the secondaries are deposited over the ovary either by direct spread within the peritoneal cavity or by lymphatic permeation. It is usually bilateral with bosselated appearance. This type is associated with ascites and peritoneal deposits. It is a peculiar to note that the ovarian secondaries are larger than secondary deposits.

The other type of secondary ovarian carcinoma is Krukenberg tumor. This tumor is bilateral with smooth surface. The capsule is intact and ovary retains its shape. The histological picture shows the characteristic picture of signet ring cell. The Krukenberg tumor is larger than the primary tumor. The primary is most commonly from pylorus, colon and breast. The mode of spread is by retrograde lymphatic spread.

MATERIALS AND METHODS

This prospective study was performed in the Institute of Obstetrics and gynaecology, Madras Medical College, Egmore, Chennai. The study was conducted during the period 2010 to 2012.

Study population : The study consisted of 200 patients who were admitted in our institute with adnexal masses.

INCLUSION CRITERIA

Patients above the age of 30 years admitted in our hospital both in premenopausal and postmenopausal age group with a diagnosis of an ovarian mass were included in the study.

EXCLUSION CRITERIA

Ovarian mass in the pregnant women were excluded because CA 125 levels will be elevated in pregnancy and hence may give a false positive result

For the same reason, patient with endometriosis was also excluded from the study.

Patients with previously diagnosed disease commonly associated with elevated CA 125 levels were excluded.

Patients on peritoneal dialysis which by constant peritoneal irritation cause an elevated CA 125 levels and are therefore exclude from the study.

This study was performed after Institutional ethical committee approval. The objective of the study was explained in detail and written consent was obtained from the patients included in the study.

Serum CA 125 and the ultrasound examination were performed at the time of preoperative laboratory assessment which was usually accomplished approximately within 1 week prior to surgery. Serum CA 125 was determined by radioimmunoassay. Ultrasound examination was performed using a 3.5-MHz abdominal convex transducer in patients with full bladder or 7.5-MHz vaginal probe in patients after empting the bladder. Ultrasound score was assigned for the following features

1. Multiloculations,
2. Presence of solid elements,
3. Bilaterality,

4. Presence of ascites, or

5. Evidence of metastases.

An ultrasound score (U) of 1 was given if none or one of the features was found, and a score of 3 was given if two or more of these features were shown.

Postmenopausal status was defined as more than one year of amenorrhea or age older than 50 years for women who had undergone hysterectomy; they were scored as M=3. All other patients who did not meet these criteria were defined in a premenopausal status which scored M=1. The absolute values of serum CA-125 was entered in formula.

Ultrasonographic examination of pelvic organs was performed, menopausal status and level of cancer antigen 125 (CA125) were assessed and finally RMI was calculated for all the patients. RMI was calculated using the formula:

RMI SCORE = *ultrasound score x menopausal score x CA 125 level in U/ ml*

After surgery, histopathological (HPE) findings of excised tumors were analysed in order to determine the final diagnosis. The histopathological diagnosis is considered as the gold standard for defining the outcomes.

Finally, based on the standard formulas, sensitivity, specificity, positive predictive value and negative predictive value of the RMI was calculated, as RMI is an index which indicates malignancy with reference to the actual presence or absence of malignancy in the ovarian mass.

SENSITIVITY:

The sensitivity is defined as the percentage of patients with malignant ovarian mass having a positive test result.

Sensitivity = [(true positive / true positive + false negative) × 100]

SPECIFICITY:

The specificity is defined as the percentage with benign ovarian mass showing negative results.

Specificity = [(true negative / true negative + false positive) × 100]

POSITIVE PREDICTIVE VALUE

The positive predictive value is defined as the percentage of patients with a positive test result having malignant ovarian mass.

Positive predictive value = [(true positive / true positive + false positive) × 100]

NEGATIVE PREDICTIVE VALUE

The negative predictive value is defined as the percentage of patients with a negative test result having benign ovarian mass.

Negative predictive value = [(true negative / true negative + false negative) × 100]

STATISTICAL ANALYSIS

Data were analyzed using chi-square tests. Descriptive statistics were used for demographic data and summarized as mean with standard deviation or frequency with percentage. Univariate analyses to determine the association of each parameter were performed using Student's t test. The independent association was then determined by logistic regression.

The predictive power of each factor and their combinations were assessed by the goodness of fit test at 1% significance and also by the receiver operating characteristic curve (ROC - Curve). The RMI was determined by combination of the three factors of CA125, Ultrasound score, and menopausal status after the logistic model test for each factor. The ROC-Curves of CA 125, and RMI were constructed to determine the appropriate cut-off value for discriminating benign from borderline and malignant tumors.

The diagnostic performances of each test were reported as sensitivity, specificity, positive predictive value, and negative predictive value with 95% confidence interval.

OBSERVATION & RESULTS

TABLE 1:

HISTOPATHOLOGY	NO. OF PATIENTS	PERCENTAGE
BENIGN	155	77.5%
MALIGNANT	45	22.5%

The study included 200 patients with ovarian mass, out of which 155 patients are benign comprising 77.5% and 45 patients are malignant comprising 22.5%.

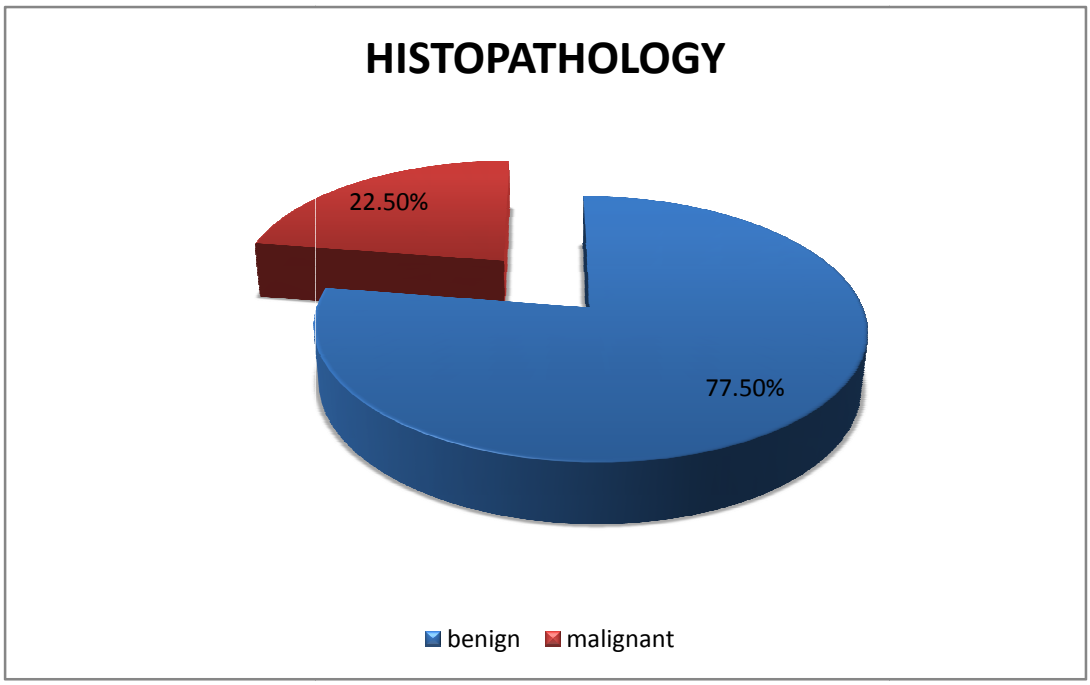


TABLE 2 : AGE DISTRIBUTION

AGE IN YEARS	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)
30-40	91 (91%)	9 (9%)	100 (50%)
41-50	38 (71.7%)	15 (28.3%)	53(26.5%)
51-60	16 (48.5%)	17 (51.5%)	33(16.5%)
>61	10 (71.4%)	4(28.6%)	14 (7%)

In the age group of 51 to 60 years, 51.5% of cases are malignant whereas in 30 to 40 years of age, only 9% are malignant. The percentage of malignant tumor increases with increase in age.

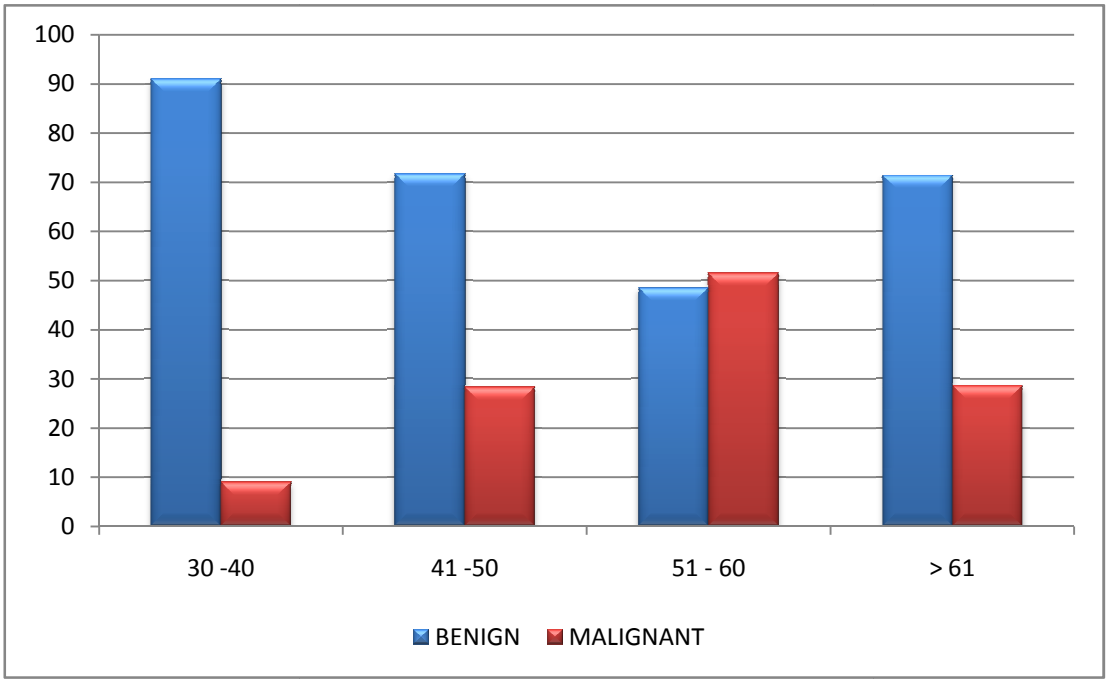


TABLE 3:

HPE	30 -40	41 -50	51 -60	>60
BENIGN	58.7%	24.5%	10.3%	6.5%
MALIGNANT	20%	33.3%	37.8%	8.9%

Among the 155 benign patients in our study, 58.7% are in the age group of 30 to 40 years, 24.5% are in the age group of 41 – 50 years, 10.3% are in the age group of 51 – 60 years and 6.5% are more than 60 years.

Among 45 malignant patients, 20% belong to 30 -40 years, 33.3% belong to 41-50 years, 37.8% belong to 51 – 60 years and 8.9% are more than 60 years. The possibility of malignancy increases with increasing age.

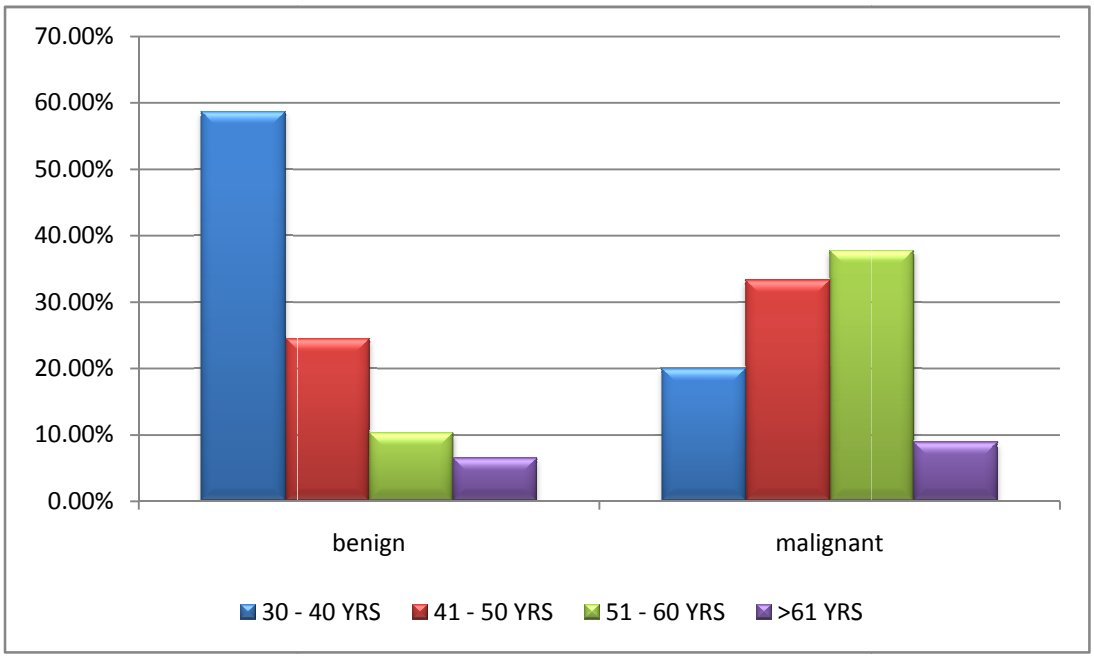


TABLE 4 : MENSTRUAL HISTORY

MENSTRUAL PATTERN	BENIGN n(%)	MALIGNANT n(%)	TOTAL n(%)
REGULAR	100 (94.3%)	6 (5.7%)	106 (53%)
IRREGULAR	28 (68.3%)	13 (31.7%)	41 (20.5%)
POST MENOPAUSAL	27 (50.9%)	26 (49.1%)	53 (26.5%)

In our study among the postmenopausal women, nearly half of the patients have malignant ovarian tumor. 5.7% of the women with regular cycles and 31.7% with irregular cycles have malignancy.

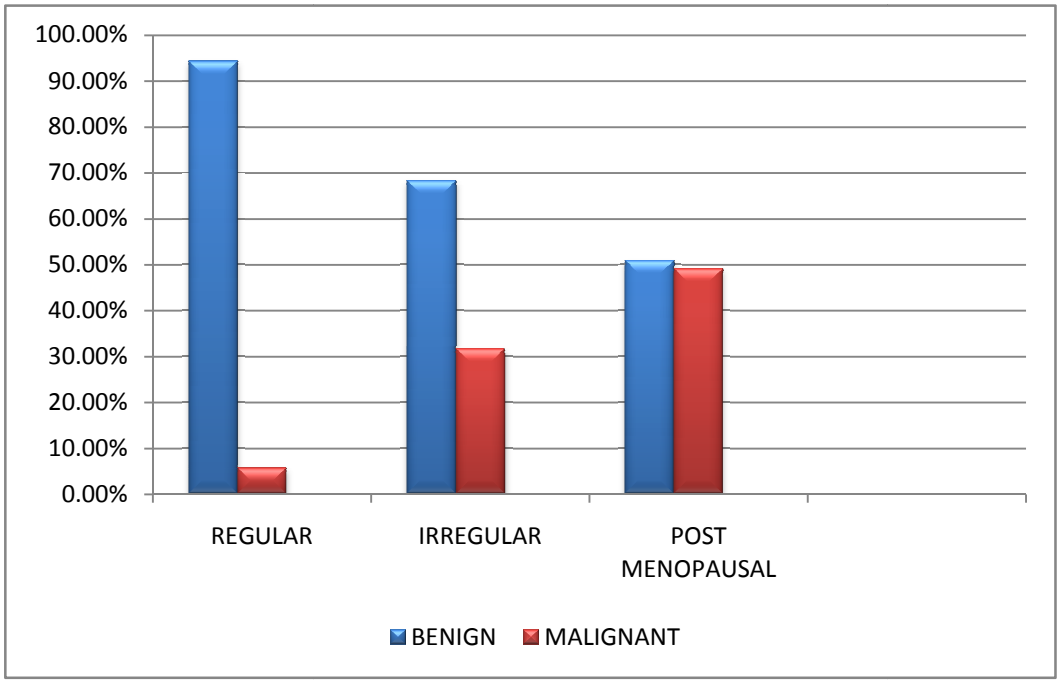


TABLE 5:

HPE	REGULAR	IRREGULAR	POST MENOPAUSAL	P value
BENIGN	64.5%	18.1%	17.4%	<0.001**
MALIGNANT	13.3%	28.9%	57.8%	

Among the women with malignant tumor (n=45), 57.8% belongs to postmenopausal age group, whereas 17.4% of patients with benign tumor are in the postmenopausal status.

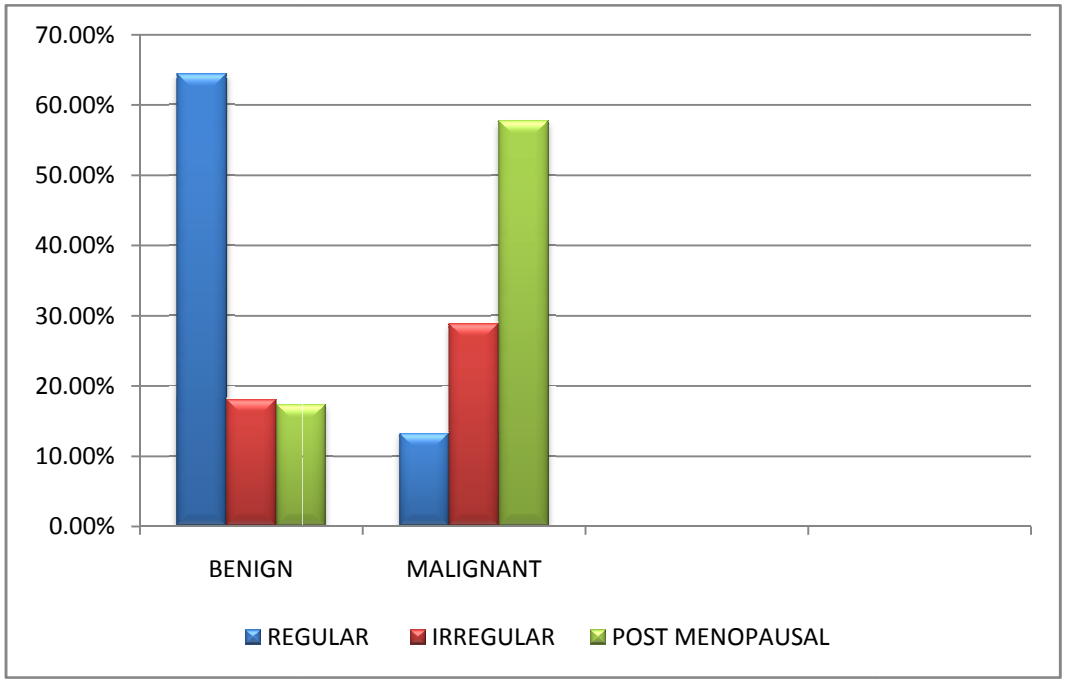


TABLE 6 : PRE MENOPAUSAL AGE GROUP

HPE	REGULAR	IRREGULAR
BENIGN	78.15%	21.9%
MALIGNANT	31.6%	68.4%

Among the 147 patients in premenopausal age group, 78.1% of patients with benign tumors have regular cycle whereas the remaining have irregular cycles. 31.6% of patients with malignant tumors have regular cycles & 68.4% have irregular cycles.

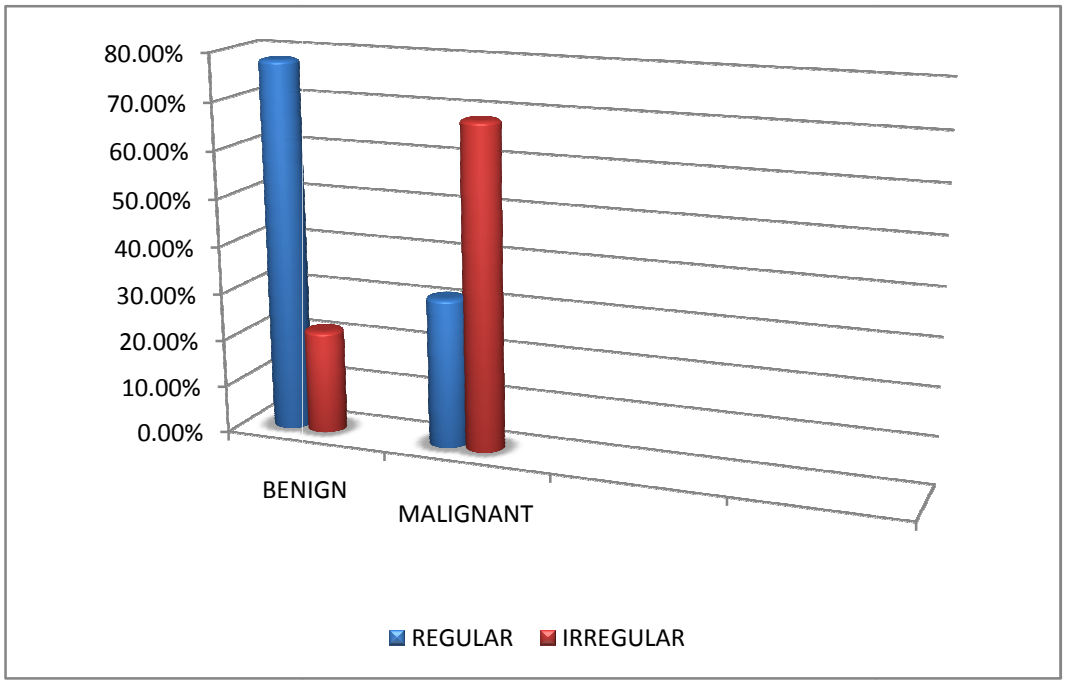


TABLE 7 : PARITY DISTRIBUTION

PARITY INDEX	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
NULLIPAROUS	14 (51.9%)	13 (48.1%)	27 (13.5%)	<0.001**
MULTIPAROUS	141 (81.5%)	32 (18.5%)	173 (86.5%)	

In our study, 27 patients are nulliparous and 173 patients are multiparous women. 51.9% has benign tumor and 48.1% of nulliparous women have malignant tumor. Among the multiparous women, 81.5% have benign tumor and 18.5% have malignant tumor.

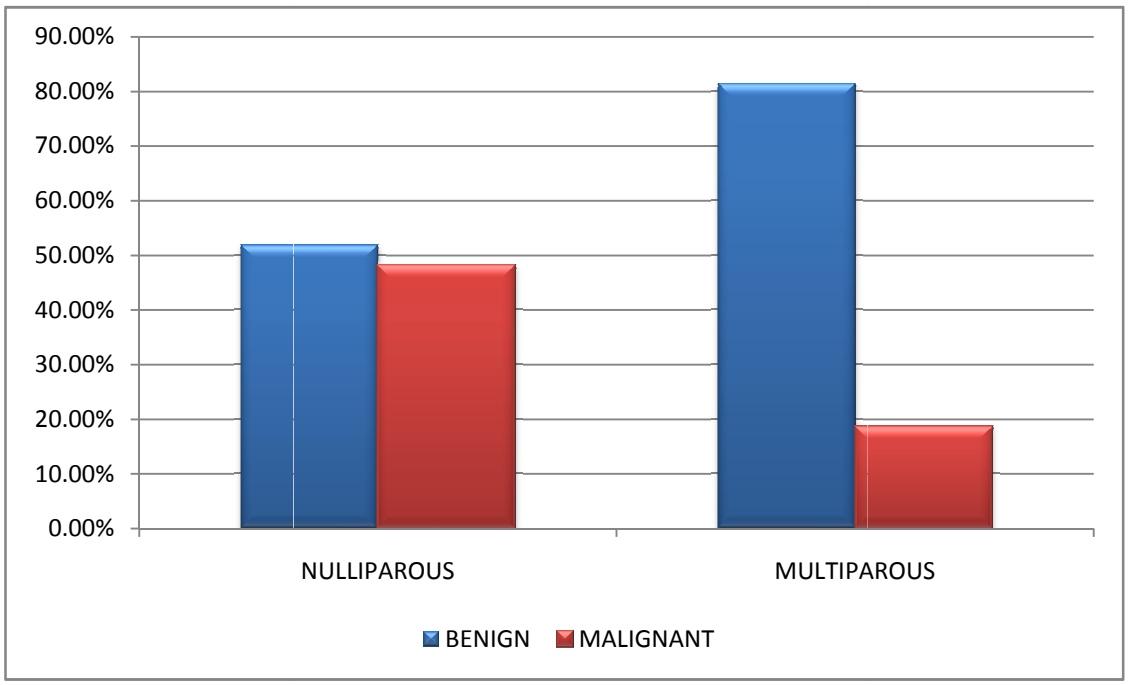


TABLE 8 : PARITY DISTRIBUTION

HPE	NULLIPAROUS	MULTIPAROUS
BENIGN	9%	91%
MALIGNANT	28.9%	71.1%

Among the patients with benign tumors, 9% are nulliparous and 91% are multiparous and among the patients with malignant tumors, 28.9% are nulliparous and 71.1% are multiparous.

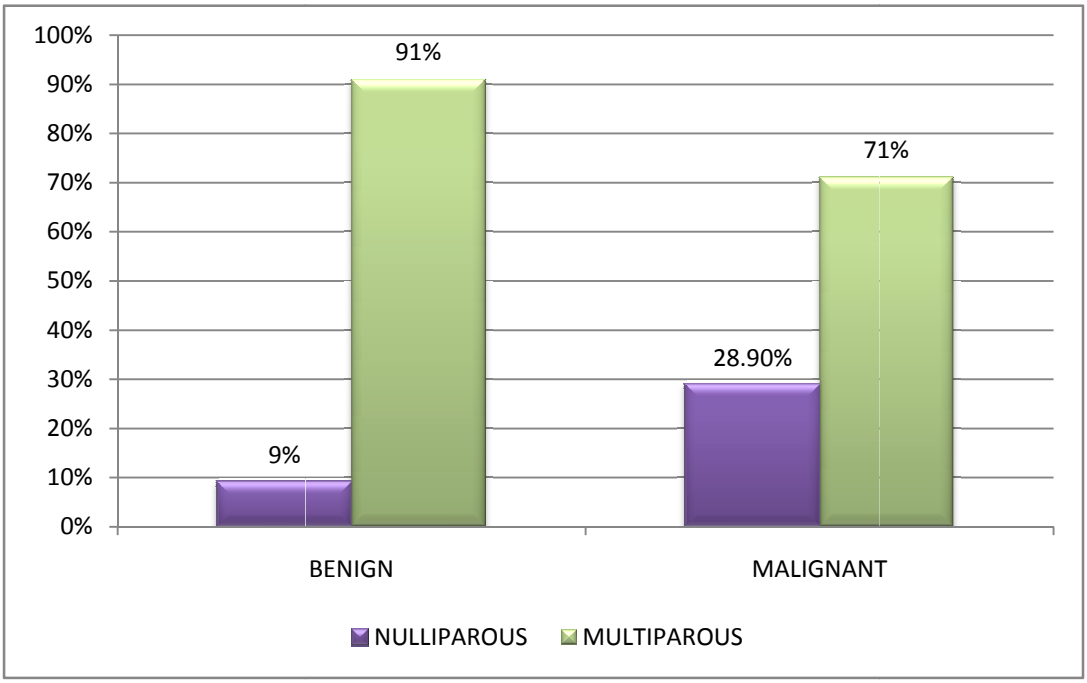


TABLE 9 : MENOPAUSAL STATUS

MENOPAUSAL STATUS	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
PREMENOPAUSAL	128 (87.1%)	19 (12.9%)	147 (73.5%)	<0.001%
POSTMENOPAUSAL	27 (50.9%)	26 (49.1%)	53 (26.5%)	

In our study, 147 patients are in premenopausal age group and 53 patients are in postmenopausal age group. Among 147 pre menopausal patients, 128 patients have benign tumor accounting for 87.1% and 19 patients have malignant tumor accounting for 12.9%.

Among 53 patients in postmenopausal age group, 27 patients have benign tumors accounting for 50.9% and 26 patients have malignant tumor accounting for 49.1%.

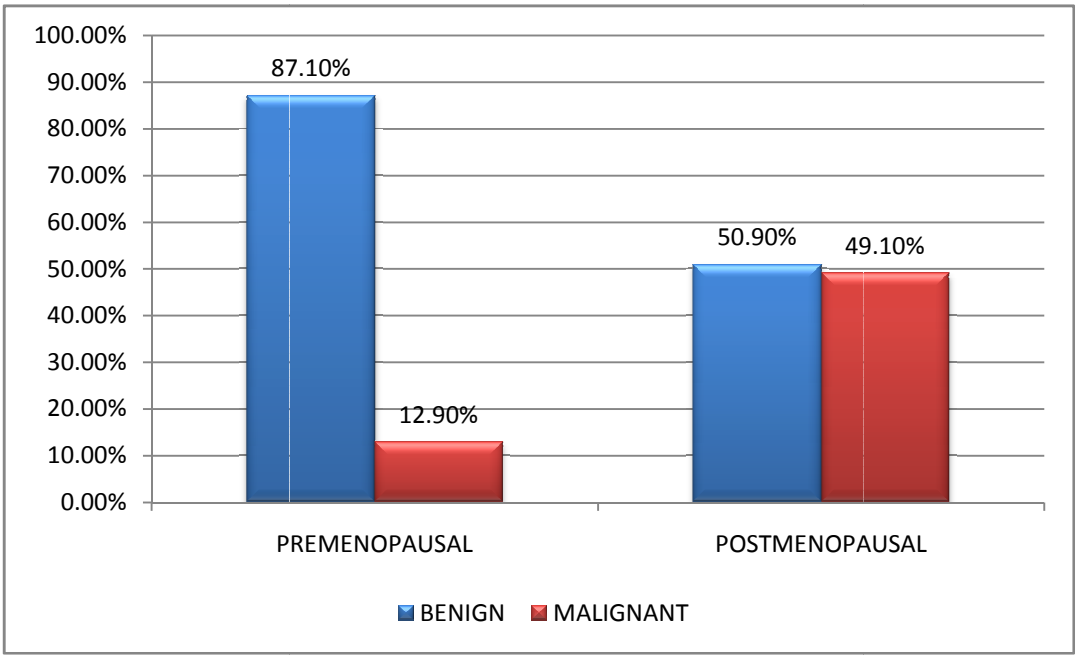


TABLE 10 :

HPE	PREMENOPAUSAL	POSTMENOPAUSAL
BENIGN	82.6%	42.2%
MALIGNANT	17.4%	57.8%

Among 155 benign tumors, 82.6% of patients are in pre menopausal age group and 17.4% are in post menopausal age group. Among 45 patients with malignant tumors, 42.2% are in pre menopausal age group and 57.8% are in postmenopausal age group. The sensitivity of the menopausal score in differentiating benign and malignant tumor is 57.8%, the specificity is 82.6%, the positive predictive value is 49.1% and negative predictive value is 87.1%.

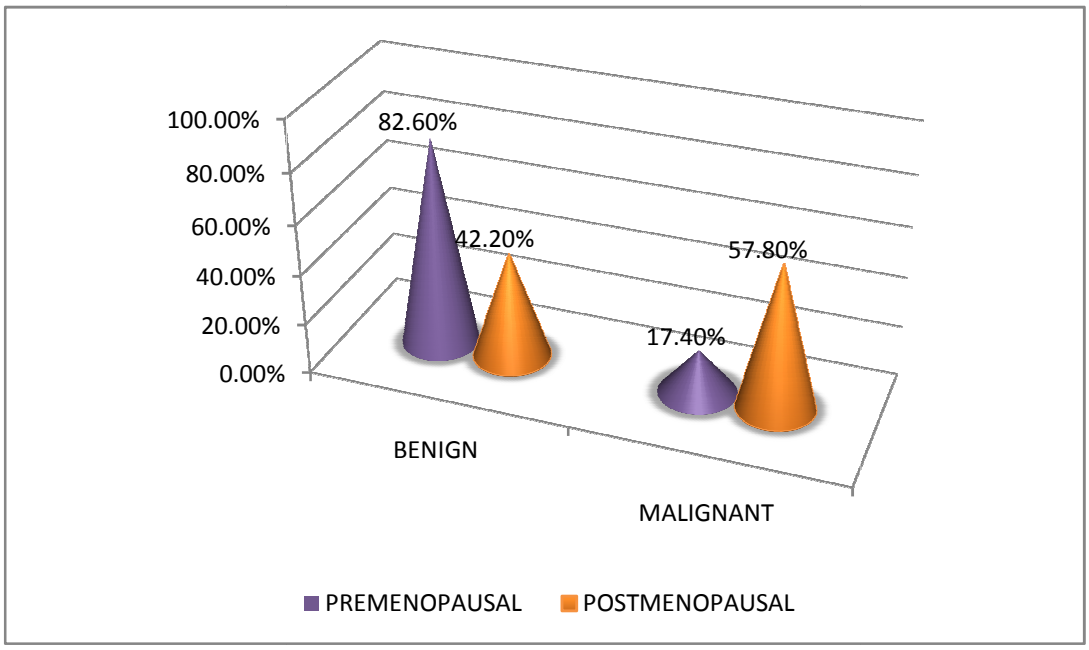


TABLE 11 : ULTRASOUND SCORE

ULTRASOUND SCORE	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
1	104 (90.4%)	11 (9.6%)	115 (57.5%)	<0.001**
3	51 (60%)	34 (40%)	85 (42.5%)	

115 patients have ultrasound score of 1, that is presence of one or more parameters in ultrasound scan. Among 115 patients, 104 patients (90.4%) have benign lesions and 11 patients (9.6%) have malignant tumor. 85 patients have ultrasound score of 3, indicating presence of 2 or more parameters of ultrasound criteria. 51 patients with ultrasound score of 3 have benign lesions accounting for 60% and 34 patients have malignant lesions accounting for 40%.

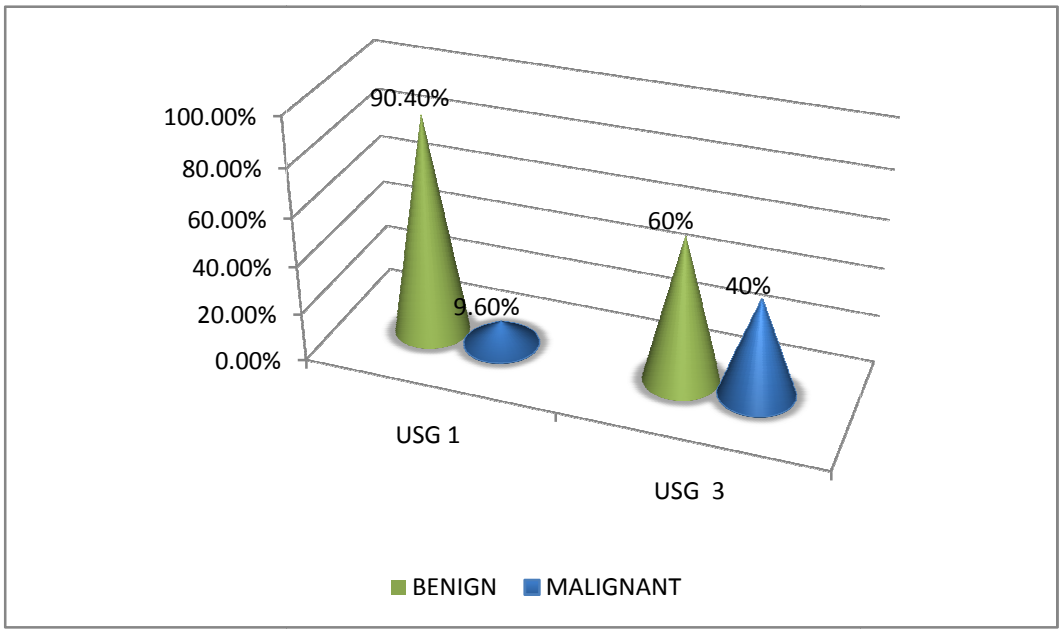


TABLE 12 :

ULTRASOUND SCORE	U=1	U=3
BENIGN	67.1%	32.9%
MALIGNANT	24.4%	75.6%

On analysis, among benign tumors 67.1% have ultrasound score of 1 and 32.9% have ultrasound score of 3. Among malignant tumor, 24.4% have ultrasound score of 1, and 75.6% have ultrasound score of 3. The performance status of ultrasound score has been analysed with sensitivity of 75.6%, specificity of 67.1%, positive predictive value of 40%, negative predictive value of 90.4% and it is statistically highly significant with P value <0.01 using pearson chi square test.

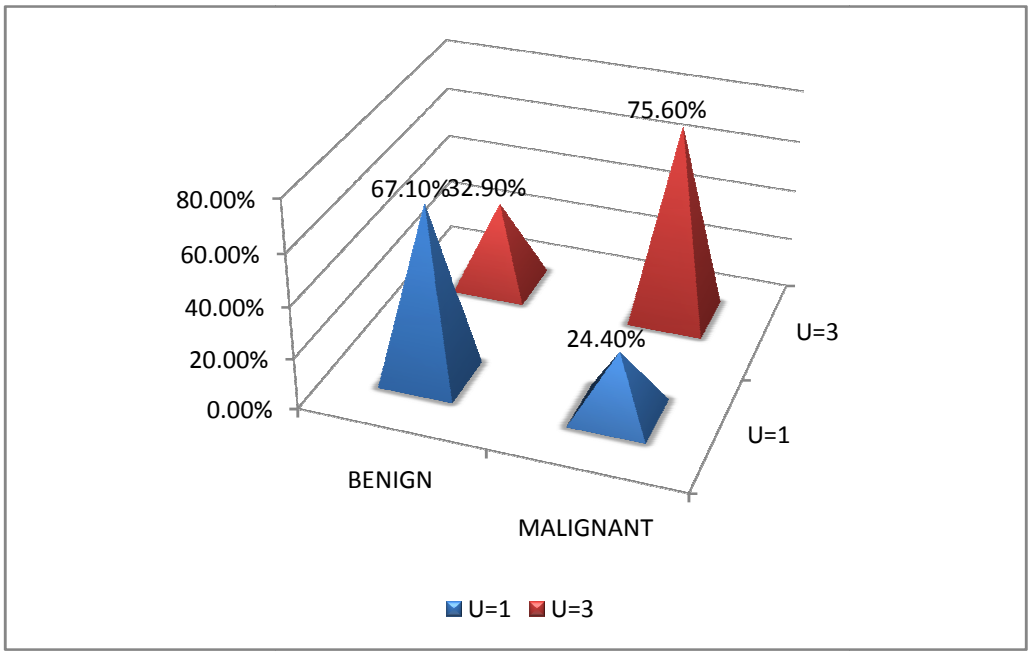


TABLE 13 : CA 125

CA 125	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
< 35 U/ml	94 (94%)	6 (6%)	100 (50%)	<0.001**
> 35 U/ml	61 (61%)	39 (39%)	100 (50%)	

The CA 125 value is analysed with a cut off value of 35 U/ml. The normal range is 0-35 U/ml. In our study, CA 125 with a cut off of 35 U/ml, 100 patients have less than 35 IU/ml and 100 patients have more than 35 U/ml. 94% of patients with CA 125 < 35 U/ml have benign lesions and 6% have malignant lesions. Among patients with CA 125>35 U/ml, 61% have benign lesions and 39% have malignant lesions.

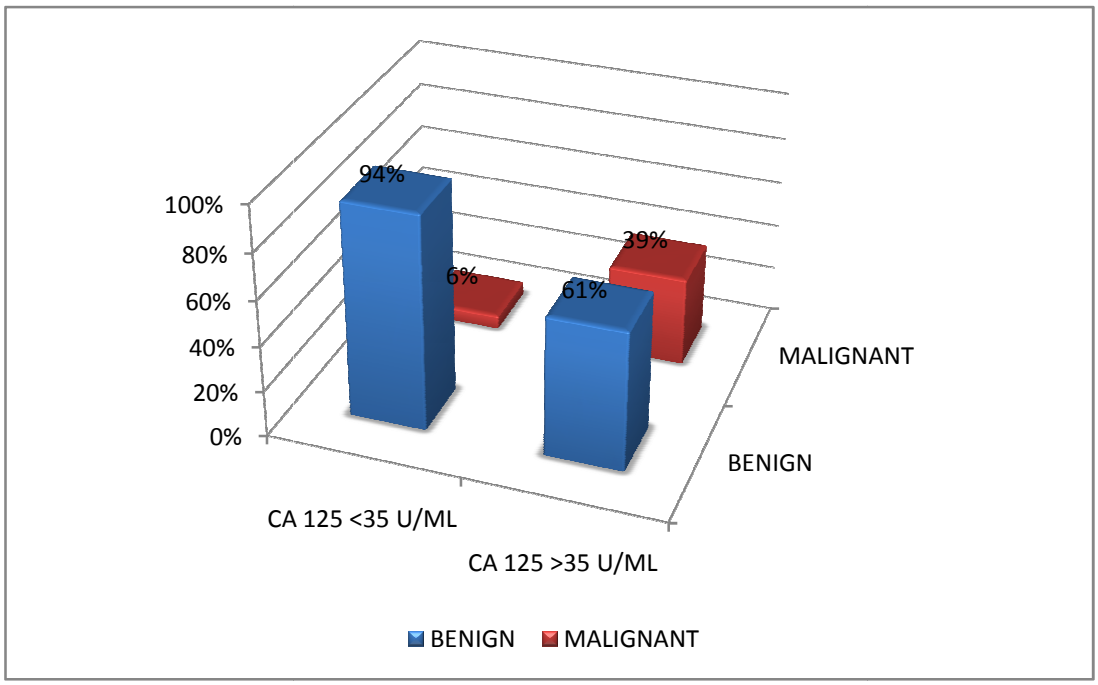


TABLE 14 :

HPE	CA 125	
	< 35 U/ml	> 35 U/ml
BENIGN	60.6%	39.4%
MALIGNANT	13.3%	86.7%

Among the patients with benign tumor, 60.6% have CA 125 <35 U/ml and 39.4% have CA 125 > 35 U/ml. whereas the patients with malignant tumor,13.3% have CA 125 < 35 U/ml and 86.7% have CA 125 >35 U/ml. The sensitivity of CA 125 in discriminating benign and malignant tumor is 86.7%, the specificity is 60.6%, the positive predictive value is 39% and negative predictive value is 94.0%.

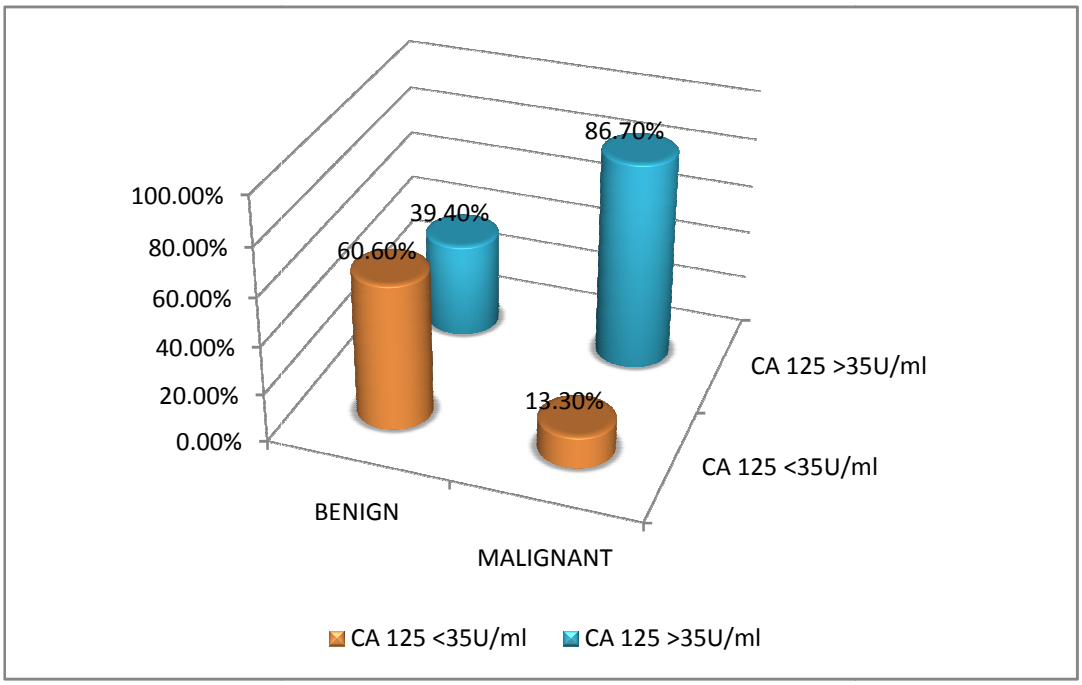


TABLE 15 : DISTRIBUTION OF RMI AT CUT OFF VALUE 100

RMI	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
<100	123 (97.6%)	3 (2.4%)	126 (63%)	<0.001**
>100	32 (43.2%)	42 (56.8%)	74 (37%)	

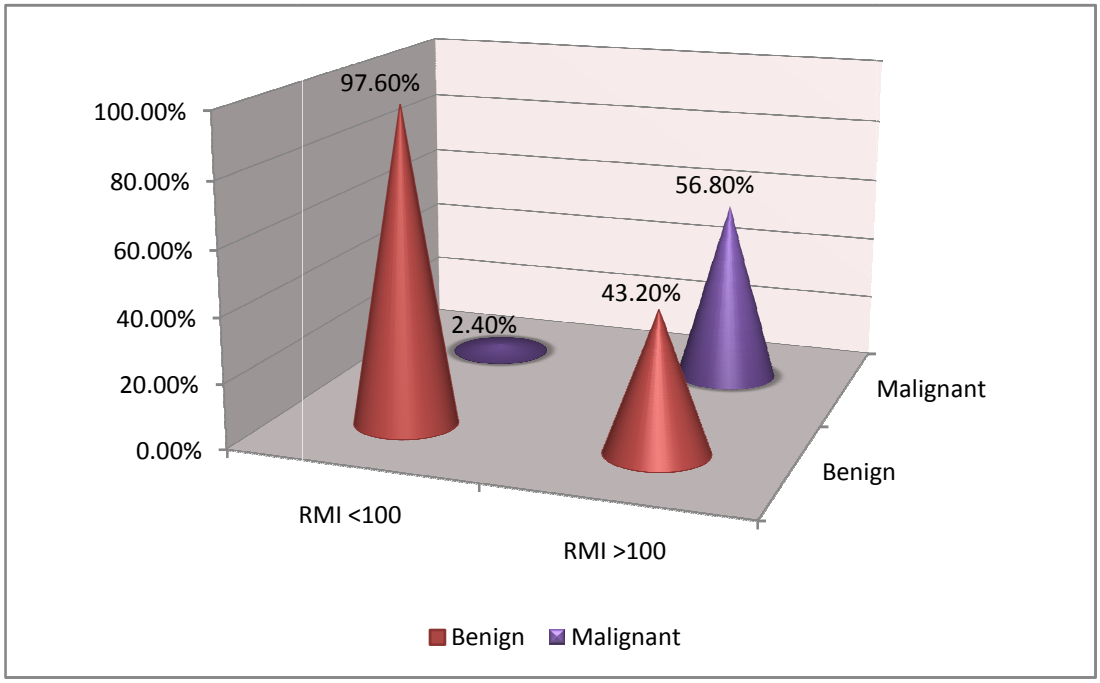
RMI AT CUT OFF VALUE OF 100

SENSITIVITY – 93.3%

SPECIFICITY – 79.4%

POSITIVE PREDICTIVE VALUE – 56.8%

NEGATIVE PREDICTIVE VALUE – 97.6%



The risk of malignancy index based on USG score, CA -125 and menopausal status was calculated preoperatively. With the cut off value of 100, 126 patients are below 100 and 74 patients are above 100. 97.6% of patient with RMI <100 have benign tumor and 56.8% of patients with RMI >100 have malignant tumor. 79.4% of patients with benign tumor have RMI <100 and 93.3% of patients with malignant tumor have RMI > 100. The sensitivity of RMI with cut off point of 100 is 93.3%, specificity is 79.4%, positive predictive value is 56.8% and negative predictive value is 97.6%.

TABLE 16 : DISTRIBUTION OF RMI AT CUT OFF VALUE OF150

RMI	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
<150	136 (93.8%)	9 (6.2%)	145 (72.5%)	<0.001**
>150	90 (34.5%)	36 (65.5%)	55 (27.5%)	

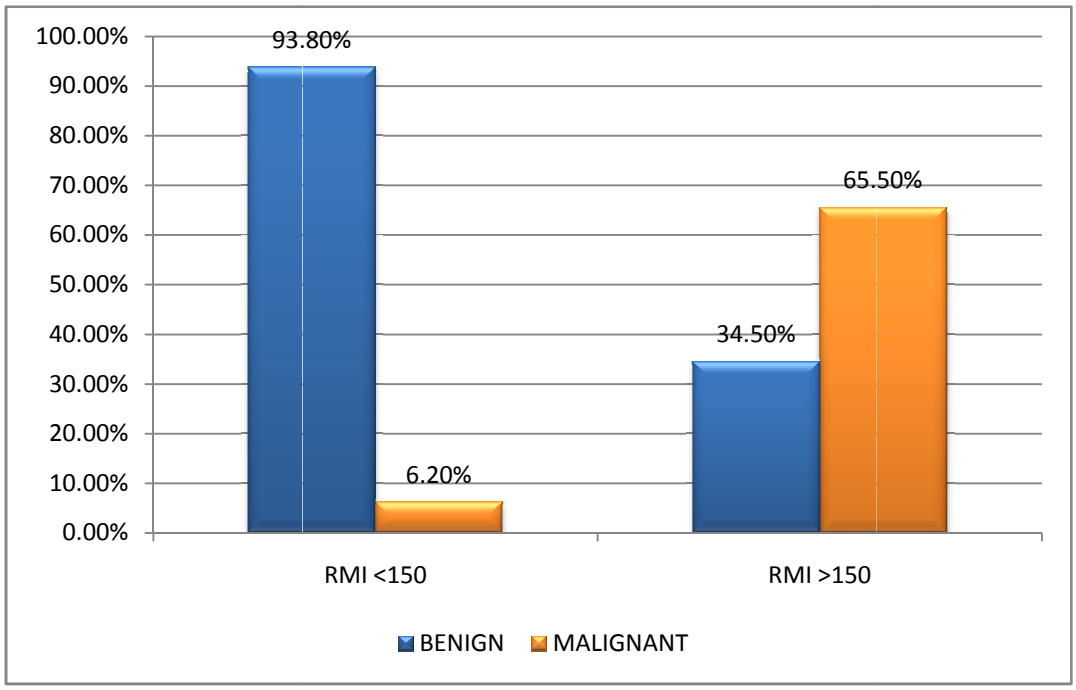
RMI AT CUT OFF VALUE OF 150

SENSITIVITY – 80%

SPECIFICITY – 87%

POSITIVE PREDICTIVE VALUE – 65.5%

NEGATIVE PREDICTIVE VALUE – 93.8%



With the cut off value of RMI at 150, 145 patients have value below 150 and 55 patients have value above 150. Patients with RMI <150, 93.8% have benign lesions and 6.2% have malignant lesions .Those with RMI > 150, 34.5% have benign lesions and 65.5% have malignant lesions. 87.7% of patients with benign tumors have RMI < 150 and 80% of patients with malignant tumors have RMI > 150. With the cut off value of 150 , sensitivity, specificity , positive predictive value and negative predictive value are S 80%, 87.7%, 65.5% and 93.8% respectively.

TABLE 17 : DISTRIBUTION OF RMI AT CUT OFF VALUE OF 200

RMI	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
< 200	146 (94.2%)	9 (5.8%)	155 (77.5%)	<0.001**
> 200	9 (20%)	36 (80%)	45 (22.5%)	

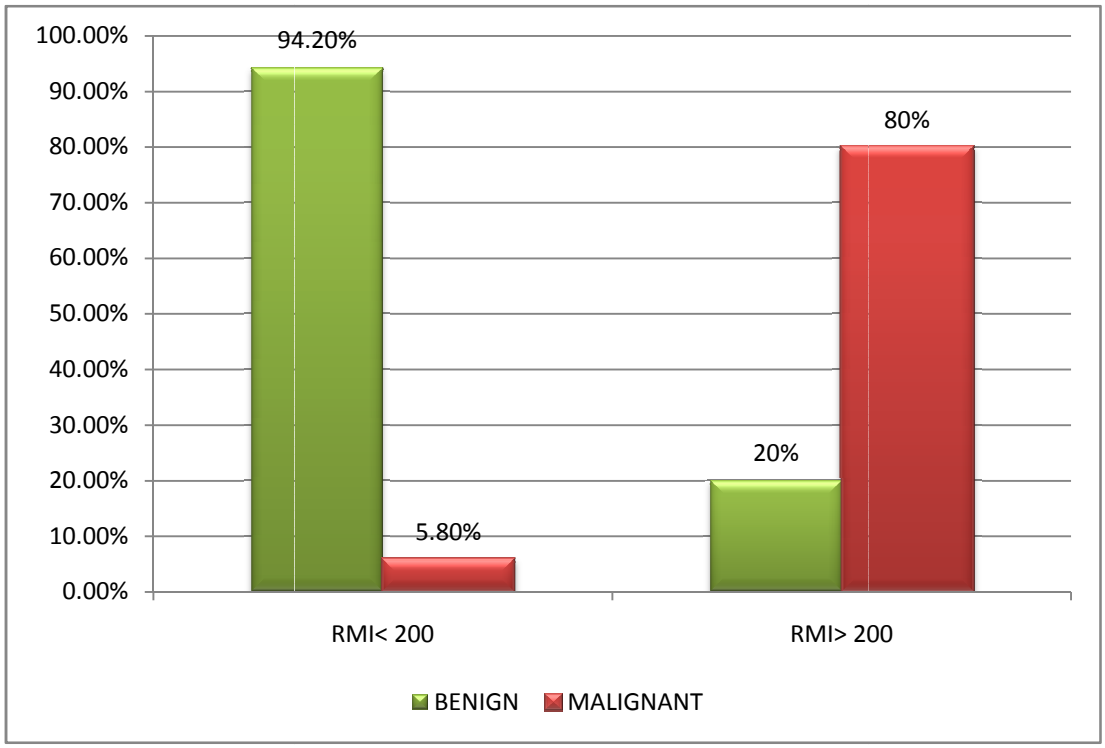
RMI AT CUT OFF VALUE OF 200

SENSITIVITY – 80%

SPECIFICITY – 94.2%

POSITIVE PREDICTIVE VALUE – 80%

NEGATIVE PREDICTIVE VALUE – 94.2%



155 patients have RMI value <200 and 45 patients have RMI > 200. 94.2% and 5.8% of patients with RMI < 200 have benign and malignant tumor respectively .Those with RMI >200, 20% have benign lesions and 80% have malignant tumors. 94.2% of the patients with benign tumor have RMI < 200 and 5.8% have RMI >200. 20% of patients with malignancy have RMI <200 and 80% have RMI >200. The sensitivity of RMI with cut off value 200 is 80% ,specificity is 94.2%, positive predictive value is 80%, negative predictive value is 94.2%.According to pearson chi-square test and Fischer exact test the P value is <0.01, which is statistically significant .

TABLE 18 : DISTRIBUTION OF RMI AT CUT OFF VALUE OF 250

RMI	BENIGN n (%)	MALIGNANT n (%)	TOTAL n (%)	P value
<250	150 (92%)	13 (8%)	163 (81.5%)	<0.001**
>250	5 (13.5%)	32 (86.5%)	37 (18.5%)	

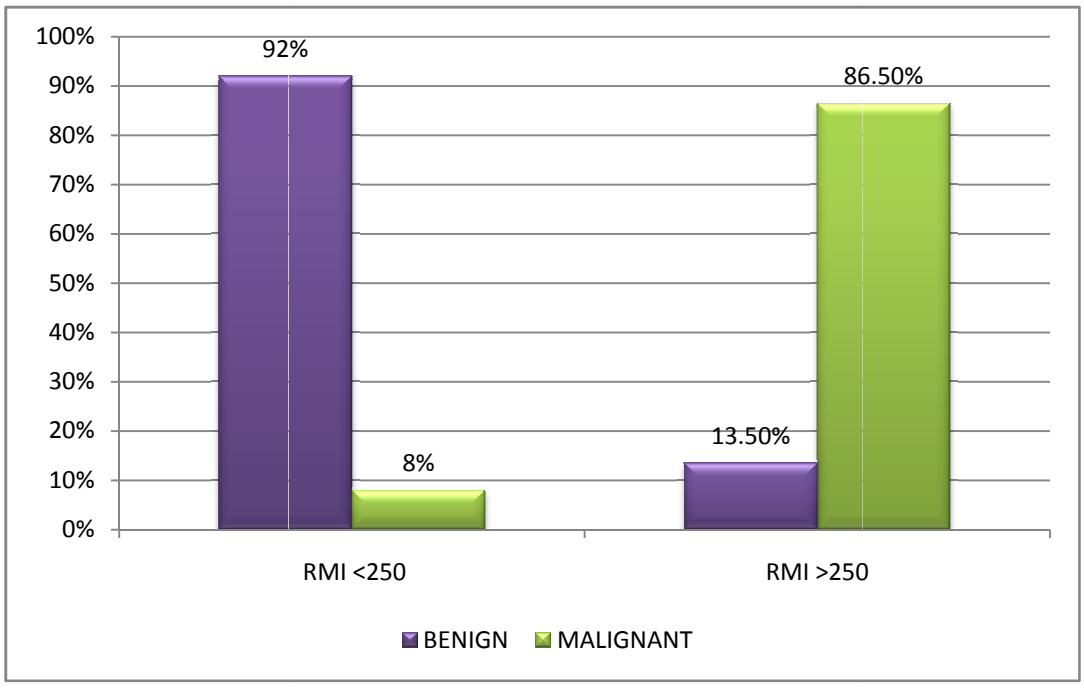
RMI AT CUT OFF VALUE OF 250

SENSITIVITY – 71.1%

SPECIFICITY – 96.8%

POSITIVE PREDICTIVE VALUE – 86.5%

NEGATIVE PREDICTIVE VALUE – 92%

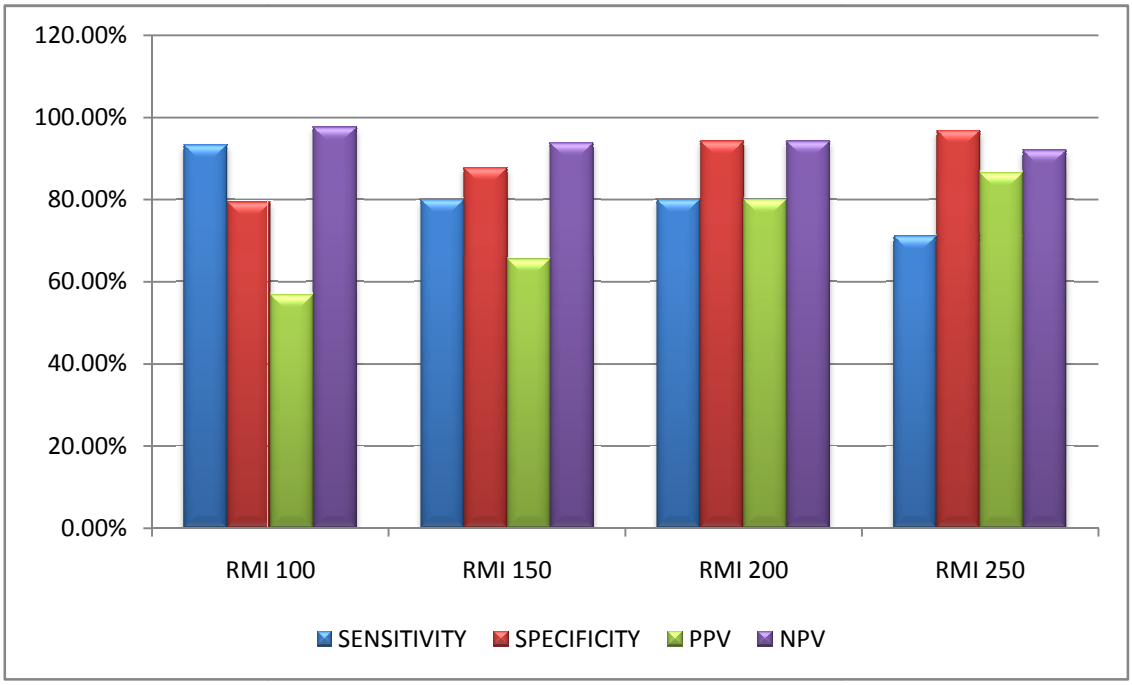


If the RMI has the cut off value of 250 , 163 patients have RMI < 250 and 37 patients have RMI > 250. 92 % of patients with RMI < 250 have benign lesion and 8% have malignant lesions.13.5% of patients with RMI > 250 have benign lesions and 86.5% of patients have malignant lesions . Among patients with benign lesion 96.8% have RMI <200 and 3.2% have RMI >200. In patients with malignant tumors 28.9% have RMI < 200, 71.1% have RMI >200.

The sensitivity of the RMI with cut off value of 250 in differentiating benign and malignant tumor is 71.1%, specificity is 96.8%, positive predictive value is 86.5% and negative predictive value is 92% .

TABLE 19 : COMPARISION OF RMI IN DIFFERENT CUT OFF VALUES

RMI CUT OFF VALUE	SENSITIVITY	SPECIFICITY	POSITIVE PREDICTIVE VALUE	NEGATIVE PREDICTIVE VALUE
100	93.3%	79.4%	56.8%	97.6%
150	80%	87.7%	65.5%	93.8%
200	80%	94.2%	80%	94.2%
250	71.1%	96.8%	86.5%	92%



The sensitivity of the RMI in discriminating benign and malignant ovarian tumor is high with the cut off value of 100. The sensitivity decreases as the cut off value of RMI is increased. The specificity of RMI is high with the cut off value of 250. As specificity is (1- sensitivity), it increases with increase in the cut off value of RMI. Likewise the positive predictive value increases with increase in the cut off value of RMI. The positive predictive value is high at the cut off value of 250. The negative predictive value decreases with increase in the cut off value of RMI. The negative predictive value is high at the cut off value of 100.

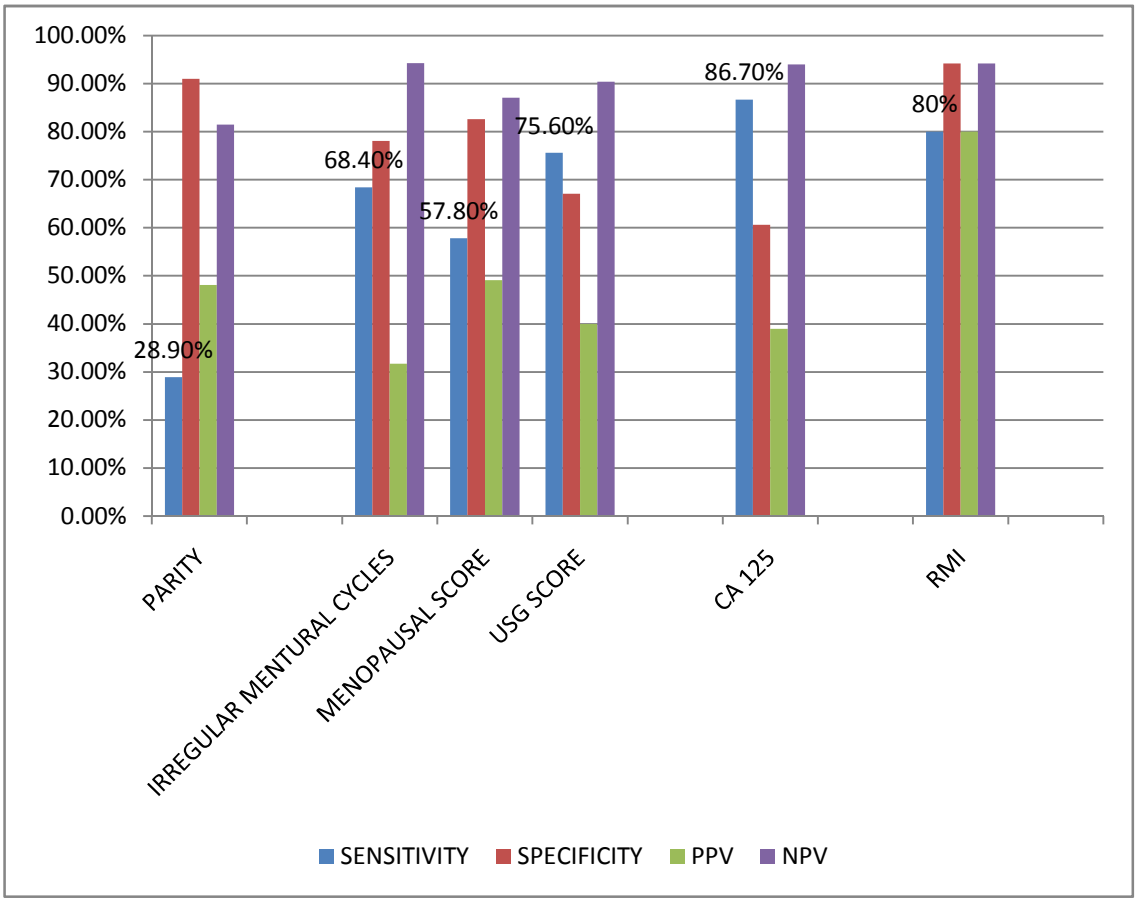
The optimal sensitivity, specificity, positive predictive value and negative predictive value for RMI is at the cut off value of 200.The cut off value of RMI at 200 is highly statistically significant, associated with the gold standard (HPE) i.e. malignant or benign.

TABLE 21: COMPARISION OF SENSITIVITY, SPECIFICITY, PPV AND NPV OF VARIOUS PARAMETERS

	SENSITIVITY	SPECIFICITY	POSITIVE PREDICTIVE VALUE	NEGATIVE PREDICTIVE VALUE
PARITY	28.9%	91%	48.1%	81.5%
IRREGULAR MENTURAL CYCLES	68.4%	78.1%	31.7%	94.3%
MENOPAUSAL SCORE	57.8%	82.6%	49.1%	87.1%
USG SCORE	75.6%	67.1%	40%	90.4%
CA 125	86.7%	60.6%	39%	94%
RMI	80%	94.2%	80%	94.2%

The sensitivity of parity as a diagnostic indicator is low 28.9%, the specificity is high 91%, the positive predictive value is 48.1% and negative predictive value is 81.5% . Menstrual disturbances as a parameter has the sensitivity 68.4%, specificity 78.1%, positive predictive value 31.7% and negative predictive value 94.3%.

The diagnostic performance of sensitivity of menopausal score is 57.8%, specificity is 82.6%, positive predictive value is 49.1% and negative predictive value is 87.1%. Thus menopausal score has high specificity and negative predictive value.



The sensitivity of ultrasound score as diagnostic modality in differentiating benign and malignant tumor is 75.6%, specificity is 67.1%, positive predictive value is 40% and negative predictive value is 90.4%. The sensitivity and negative predictive value are high for ultrasound score.

The sensitivity of CA 125 with a cut off value of 35 U/ml is 86.7%, specificity is 60.6%, positive predictive value is 39% and negative predictive value is 94%. CA 125 has high sensitivity and negative predictive value.

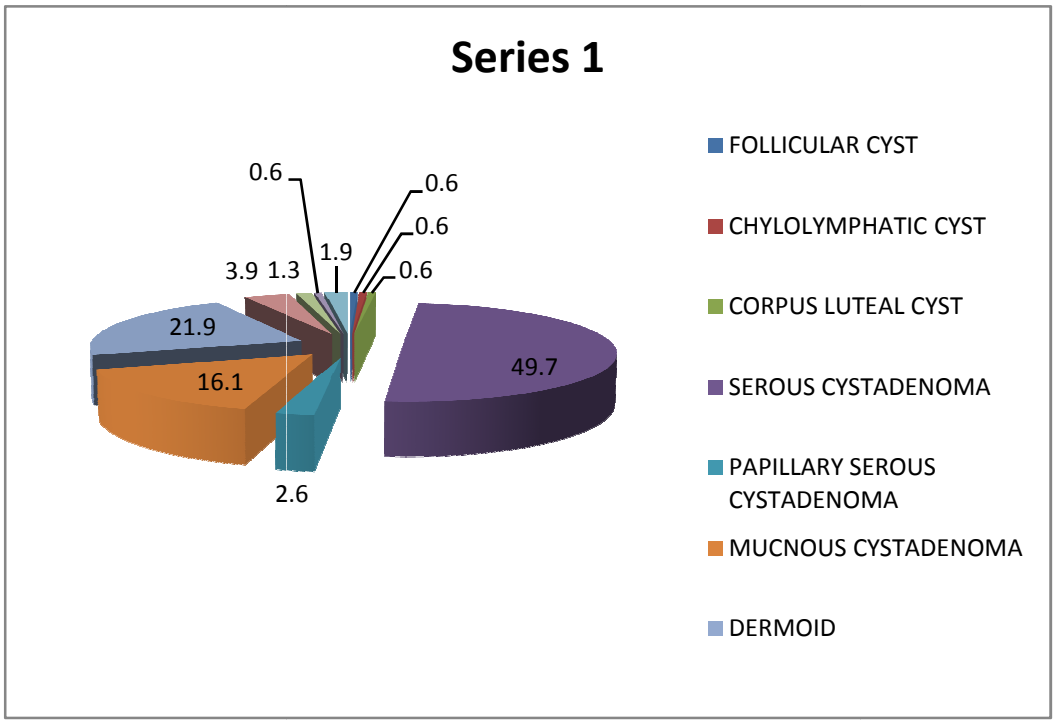
The diagnostic performance of sensitivity, specificity, positive predictive value and negative predictive value of RMI at cut off value of 200 are 80%, 94.2%, 80% and 94.2% respectively. We found that RMI has better performance than CA 125, ultrasound score and menopausal score.

HISTOPATHOLOGY

BENIGN TUMORS

S.NO	HISTOPATHOLOGY	NO. OF PATIENTS	% OF BENIGN TUMORS	% OF TOTAL
1	FOLLICULAR CYST	1	0.6	0.5
2	CHYLOLYMPHATIC CYST	1	0.6	0.6
3	CORPUS LUTEAL CYST	1	0.6	0.5
4	SEROUS CYSTADENOMA	77	49.7	38.5
5	PAPILLARY SEROUS CYSTADENOMA	4	2.6	2
6	MUCNOUS CYSTADENOMA	25	16.1	12.5
7	DERMOID	34	21.9	17
8	SIMPLE SEROUS CYST	6	3.9	3
9	STRUMA OVARII	2	1.3	1
10	LUETINISED THECOMA	1	0.6	0.5
11	FIBRO THECOMA	3	1.9	1.5

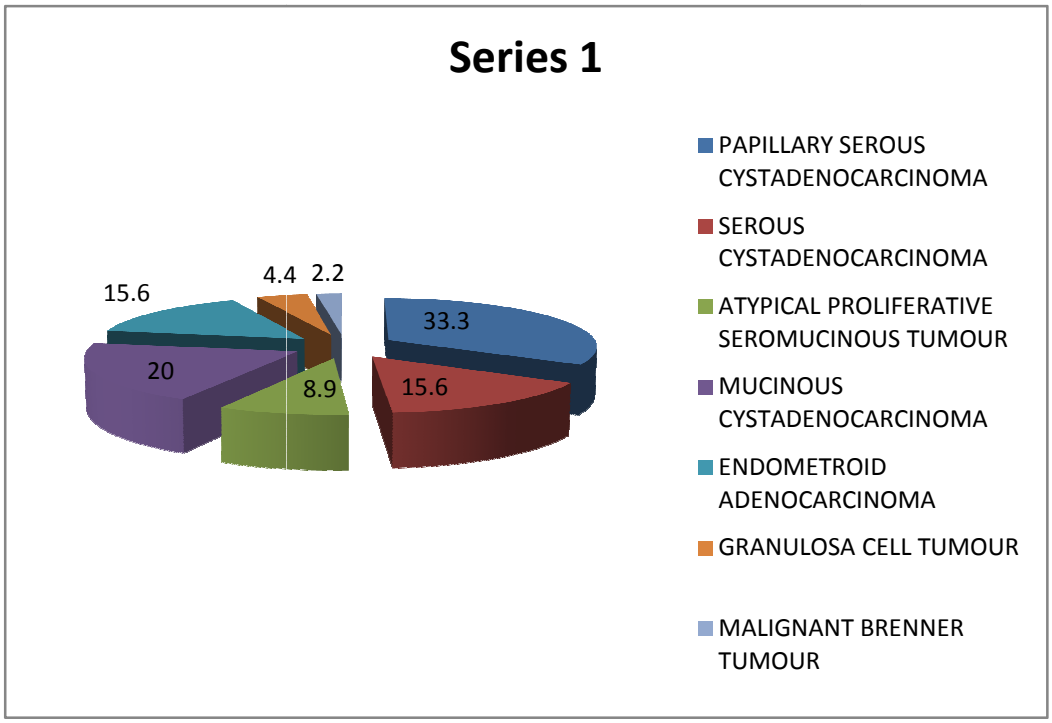
In the study, serous cystadenoma is the most common benign tumor in our population. The incidence is 38.5% and accounts for 49.7% of benign tumors. The second common benign tumor is dermoid constituting 17% of total cases and 21.9% of benign tumors. The next common benign tumor is mucinous cystadenoma which accounts for 12.5% of total cases and 16.1% of benign cases.



MALIGNANT TUMORS

S.NO	HISTOPATHOLOGY	N0.OF PATIENTS	% OF MALIGNANT	% OF TOTAL
1	PAPILLARY SEROUS CYSTADENO CARCINOMA	15	33.3	7.5
2	SEROUS CYSTADENO CARCINOMA	7	15.6	3.5
3	ATYPICAL PROLIFERATIVE SEROMUCINOUS TUMOR	4	8.9	2
4	MUCINOUS CYSTADENO CARCINOMA	9	20	4.5
5	ENDOMETROID ADENOCARCINOMA	7	15.6	3.5
6	GRANULOSA CELL TUMOR	2	4.4	1
7	MALIGNANT BRENNER TUMOR	1	2.2	0.5

In our study, the most common malignant tumor is papillary cystadenocarcinoma comprising 33.3% of patients with malignant cancer. It accounts for 7.5% of total patients. The second common malignant tumor is mucinous cystadenocarcinoma accounting for 20% of benign cases and 4.5% of total cases. The next common malignant tumors are serous cystadenocarcinoma, endometrioid carcinoma each accounting for 15.6% of malignant patients and 3.5% of total patients.

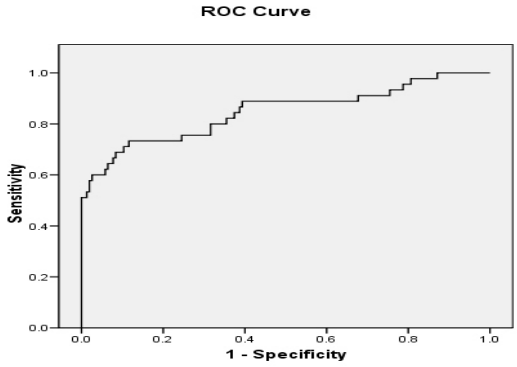


DISTRIBUTION OF AGE, MENOPAUSAL STATUS, ULTRASOUND SCORE, CA 125 LEVELS AND RMI IN PATIENTS WITH BENIGN OVARIAN MASS (n=155) AND MALIGNANT OVARIAN MASS (n=45)

CRITERIA	BENIGN	MALIGNANT	P VALUE
AGE (MEAN +/_ SD)	40.74 +/_ 10.36	49.47 +/_ 9.96	< 0.001**
MENOPAUSAL STATUS PREMENOPAUSAL	128 (87.1%)	19 (12.9%)	< 0.001**
POSTMENOPAUSAL	27 (50.9%)	26 (49.1%)	
ULTRASOUND SCORE 1	104 (90.4%)	11 (9.6%)	< 0.001**
3	51 (60%)	34 (40%)	
SERUM CA 125 (MEAN+/_SD)	34.20 +/_26.22	212.67 +/_222.24	< 0.001**
RMI (MEAN +/_SD)	81.56+/-133.3	1158.45 +/_1752.13	< 0.001**

The statistical analysis of multiple variables showed that CA 125, ultrasound score and RMI are the independent predictors of malignancy.

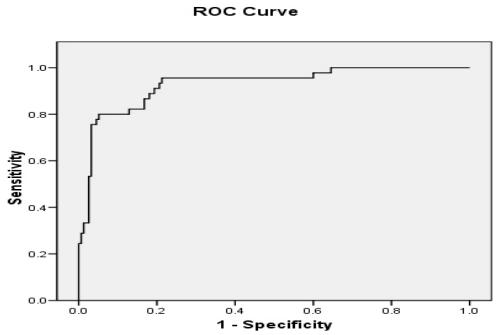
RECEIVER OPERATING CHARACTERISTIC CURVES



Test Result Variable(s): RMI

Area	Std. Error(a)	Asymptotic Sig.(b)	Asymptotic 95% Confidence Interval	
.929	.022	.000	.885	.973

a. Under the nonparametric assumption
b. Null hypothesis : True area = 0.5



Test Result Variable(s): CA 125

Area	Std. Error(a)	Asymptotic Sig.(b)	Asymptotic 95% Confidence Interval	
.847	.039	.000	.771	.924

a. Under the nonparametric assumption
b. Null hypothesis : True area = 0.5

DISCUSSION

In our study, the peak incidence of the malignant ovarian tumor was 51-60 years of age during which 51.6% of ovarian tumors were malignant. The study shows that among those less than40 years of age group, most of the neoplasms were benign and as age increases the risk of malignancy increases.

Various case control studies have shown that pregnancy reduces the risk of ovarian cancer. One pregnancy reduces the risk of ovarian cancer by as much as one third and with subsequent preganancies the risk lowers further. Infertility has an increased risk of ovarian malignancy around 2 fold. In our study the ovarian mass among nulliparous women had more incidence of malignancy when compared to multiparous women. The study showed among nulliparous women 48.1% had malignant tumors compared to 18.5% in multiparous women.

On analysing the menstrual history, nearly half of the postmenopausal women had malignant ovarian tumor. Among menstruating women there was a high chance of malignancy in those

with irregular cycles when compared to patients with regular cycle. The most common irregularity noted was prolonged cycles.

The study showed that the patients who had malignant ovarian neoplasm, most of them were in the postmenopausal status. 49.1% of postmenopausal women had malignancy when compared to 12.9% in premenopausal women. Thus in postmenopausal women the malignant neoplasms are more common.

Sonographic evaluation of the structure of an ovarian mass in predicting the risk of malignancy have been reported. Many investigators have developed the objective Ultrasound score according to various ovarian morphologies to minimize the examiners descriptive interpretation which may be varied and not reproducible. Many scoring systems based on various ultrasonographic morphologies have been made for this purpose. These scoring morphologies are tumor volume, number of locularities, wall thickness, inner wall structure, septal structure, and shadowing or echogenicity or solid area . At different cut-off levels of Ultrasound scores as an indicator for discrimination of benign from malignant tumors, the sensitivity, specificity, positive predictive value (PPV) and

a negative predictive value (NPV) from these studies ranged from 74-88%, 40-65%, 28-36%, and 90-95%, respectively. Ferrazzi et al [45]., in1997, developed the new multicenter scoring system in determination of malignancy status of ovarian tumors based on the ultrasound morphology of the ovarian cyst wall, septae, vegetations, and echogenicity. The new scoring system yielded better result than the previous scoring systems reported in the other studies with the accuracy, sensitivity, specificity, positive predictive value and negative predictive value of 72%, 87%, 67%, 41% and 95%, respectively.

For ultrasonographic technique in diagnosing ovarian cancer the sensitivity was 62% and specificity was 73% as shown in various study including Morgante et al [23] 1999, Leelahakorn et al [47] 2005.

In our study, the sensitivity of ultrasonographic score was 75.6% and specificity was 67.1%, the positive predictive value was 40% and negative predictive value was 90.4%.

The study showed that ultrasonogram of complex ovarian mass has more malignant potential.

All though the value of CA 125 as a screening test for ovarian cancer is yet unsettled, its role for a differential diagnosis of ovarian mass is clearly established. CA125 a tumor marker for ovarian cancer is not specific. With a cut off value of 35 U/ml,

True positive – 39%

True negative – 94%

False positive – 61%

False negative – 6%

Among the six false negative cases, 2 cases were granulosa cell tumor. 3 were mucinous cystadenocarcinoma and one was borderline papillary serous cystadenocarcinoma.

Among 61% false positive cases, 81.96% (50 cases) were serous cystadenoma, less than 10% (6 cases) were mucinous cystadenoma.

CA 125 level has overall range of 6.7 – 832.64.The high values of CA 125 is found most commonly with papillary serous cystadenocarcinoma and endometrioid adenocarcinoma.

Benjapi bal et al [44], 2007 showed that CA 125 at the cut off level of 35 U/ml had the sensitivity of 83.1% and specificity of 39.3%. In 2010, Rachmasari putri et al study showed that CA 125 level at a cut off value of 35 U/ml had a sensitivity of 81.43% and specificity of 60%, positive predictive value of 87.69% and negative predictive value of 48%.

In our study, the sensitivity was 86.7% and the specificity was 60.6% the positive predictive value and the negative predictive value were 39% and 94% respectively. Our study showed that CA 125 has high sensitivity and high negative predictive value. The specificity was poor in predicting malignancy.

RMI was calculated using the formula for each patient included in the study (n=200). Out of 200 patients, the RMI with cut off value of 200,155 patients had benign tumor and 45 patients had malignant tumor.

True positive	-	36 cases
True negative	-	146 cases
False positive	-	9 cases
False negative	-	9 cases
Total	-	200 cases

9 patients with RMI less than 200 had malignant ovarian cancer constituting false negative (5.8%). Out of 9 patients, 2 patients had granulosa cell tumor and 7 patients had mucinous cystadenocarcinoma.

Among the 45 patients with RMI >200, 9 patients (20%) had benign tumors constituting the false positive cases. Out of 9 patients, 8 patients had serous cystadenoma and 1 patient had mucinous cystadenoma.

Thus serous cystadenoma was the most common cause of false positivity and mucinous cystadenocarcinoma was the most common cause for false negativity.

The false positive rates are important when a particular test has to be used in low risk populations diagnosed with ovarian mass during screening of ovarian abnormalities.

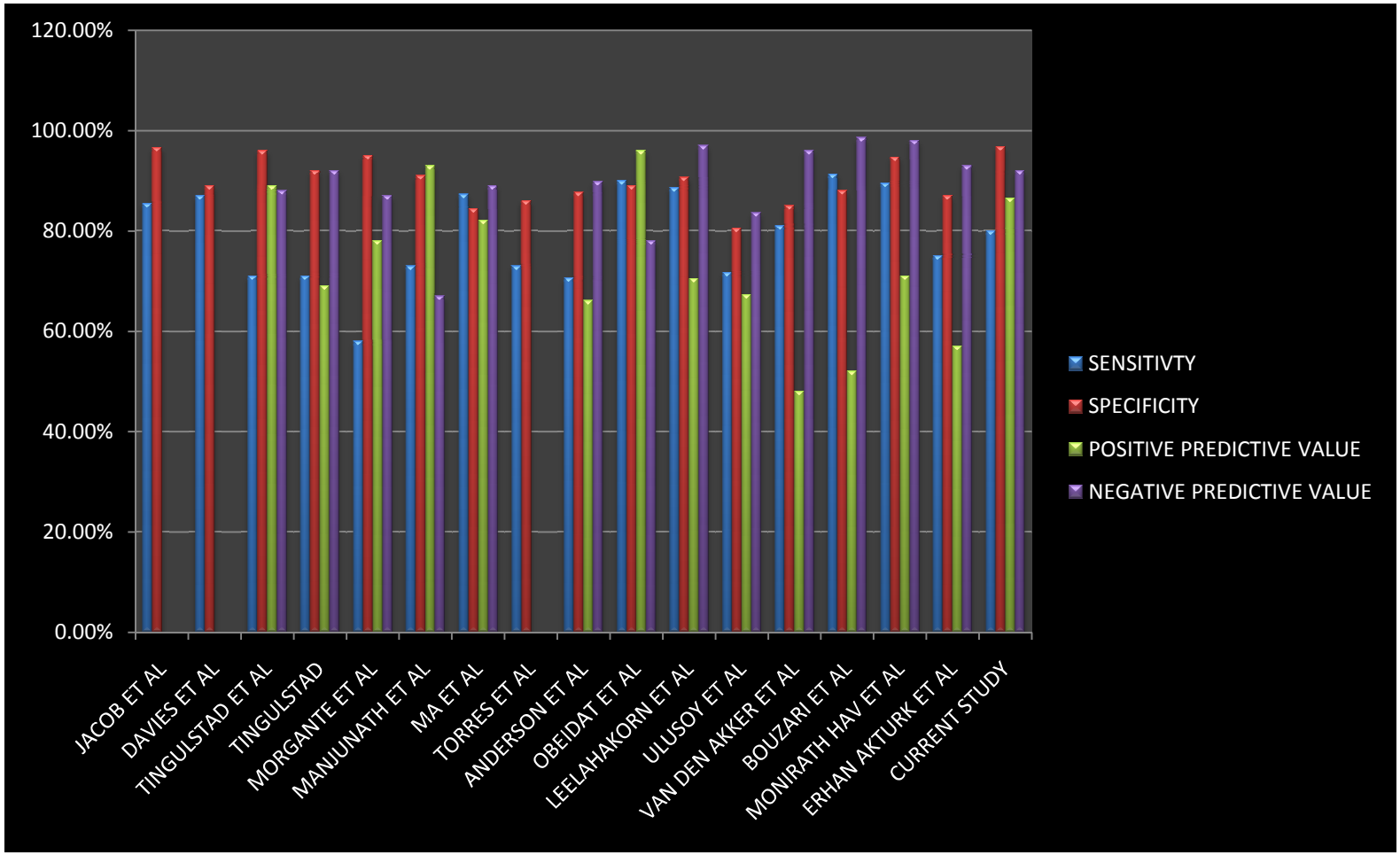
Among the benign tumors, the RMI had a range from 6.7 to 865.35.The mean RMI was 81.55 with SD 133.31. Among the malignant tumors the range is from 28.92 to 7493.76. The average RMI was 1158.44 with SD 1752.13. This was statistically significant with P value <0.001**.

In our study, the performance of sensitivity, specificity, positive predictive value and negative predictive value of RMI at various cut off levels of 100,150, 200, 250, were analysed. At a cut off level of 100, the RMI had highest sensitivity (93.3%) and negative predictive value (97.6%).The specificity (79.4%) and positive predictive value (56.8%) were low. As the cut off levels are increased, the sensitivity decreases and specificity increases. RMI at cut off value of 250, has the highest specificity (96.8%) and positive predictive value (86.5%). The sensitivity was low 71.1%. Multiple studies have shown that the best cut off value of RMI is 200. In our study, the performance of RMI at 200 is statistically significant as shown by the sensitivity 80%, specificity 94.2%, positive predictive value 80% and negative predictive value 94.2%.

COMPARISON OF THE VARIOUS PREVIOUS STUDIES WITH THE PRESENT STUDY

STUDY	YEAR	NO. OF PTS	SENSITI-VITY	SPECIFI-CITY	PPV	NPV
JACOB ET AL	1990	143	85.4%	96.6%	-	-
DAVIES ET AL	1993	124	87%	89%	-	-
TINGULSTAD ET AL	1996	173	71%	96%	89%	88%
TINGULSTAD	1999	365	71%	92%	69%	92%
MORGANTE ET AL	1999	124	58%	95%	78%	87%
MANJUNATH ET AL	2000	152	73%	91%	93%	67%
MA ET AL	2003	140	87.3%	84.4%	82.1%	89%
TORRES ET AL	2003	158	73%	86%	-	-
ANDERSON ET AL	2003	180	70.6%	87.7%	66.1%	89.8%
OBEIDAT ET AL	2004	100	90%	89%	96%	78%
LEELAHAKORN ET AL	2005	175	88.6%	90.7%	70.5%	97%
ULUSOY ET AL	2007	296	71.7%	80.5%	67.3%	83.6%
VAN DEN AKKER ET AL	2010	548	81%	85%	48%	96%
BOUZARI ET AL	2011	182	91.3%	88%	52%	98.58%
MONIRATH HAV ET AL	2011	151	89.5%	94.7%	71%	98%
ERHAN AKTURK ET AL	2012	100	75%	87%	57%	93%
PRESENT STUDY	2012	200	80%	96.8%	86.5%	92%

VALUES FOR RMI 200


120.00%
100.00%
80.00%
60.00%
40.00%
20.00%
0.00%
JACOB ET AL
DAVIES ET AL
TINGULSTAD ET AL
TINGULSTAD
MORGANTE ET AL
MANJUNATH ET AL
MA ET AL
TORRES ET AL
ANDERSON ET AL
OBEIDAT ET AL
LEELAHAKORN ET AL
ULUSOY ET AL
VAN DEN AKKER ET AL
BOUZARI ET AL
MONIRATH HAV ET AL
ERHAN AKTURK ET AL
CURRENT STUDY
SENSITIVTY
SPECIFICITY
POSITIVE PREDICTIVE VALUE
NEGATIVE PREDICTIVE VALUE

SUMMARY

- 200 women with ovarian mass above 30 years of age were selected for the study. Patients with pregnancy and endometriosis are excluded.
- 50% patients were in the age group of 30 – 40 years,26.5% in 41 – 50 years, 17.5 % in 51 – 60 years and 7% in >60 years.
- General and gynaecological examination was done for all cases.
- Ultrasound pelvis was done for all patients and the presence of bilateral ovarian mass, multiloculated tumor, presence of solid areas, ascites and extraovarian metastasis were noted. An ultrasound score (U) of 1 was given if none or one of the features was found, and a score of 3 was given if two or more of these features were shown.
- Serum CA 125 level was measured preoperatively.
- Postmenopausal status was defined as more than one year of amenorrhea or age older than 50 years for women who had undergone hysterectomy; they were scored as M=3. All other patients who did not meet these criteria were defined in a premenopausal status which scored M=1.

- Risk of malignancy index was calculated based on RMI 3 (modified by Tingulstad [20] in 1999).
- Laparotomy was done for all cases and the specimen was sent for histopathological examination which is the gold standard.
- 77.5% of the tumor was benign and 22.5% was malignant.
- Prediction of malignancy by CA 125, ultrasound and RMI was compared and analysed .
- The optimal sensitivity, specificity, positive predictive value and negative predictive value for RMI was at the cut off value of 200.
- The diagnostic performance of sensitivity , specificity, positive predictive value and negative predictive value of RMI at cut off value of 200 were 80%, 94.2%, 80% and 94.2% respectively.
- Though CA 125 was highly sensitive (sensitivity was 86.7%), specificity and PPV were poor.
- The study showed that RMI has the better performance than CA 125, ultrasound score and menopausal score in the prediction of malignancy.

CONCLUSION

Risk of malignancy index is a reliable method for differentiating benign and malignant ovarian mass preoperatively.

Risk of malignancy index is a multimodal approach that is simple and easily applicable in preoperative evaluation of patients with ovarian tumor.

Risk of malignancy index is a better diagnostic scoring index in discriminating benign and malignant tumor when compared to individual test of ultrasonogram or CA 125 level.

The optimal cut off point that best distinguishes benign from malignant ovarian mass for RMI is 200 in the present study.

RMI is the most useful diagnostic index in proper selection of patients who may require referral to tertiary care centres.

Since the specificity of Risk of malignancy index is high, there is a potential role for this index in selection of cases for conservative management or minimal invasive surgery of benign cases like ultrasound guided aspiration or laparoscopic excision of the cysts.

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PROFORMA

NAME : AGE : IP NO :

SE CLASS : RELIGION :

PRESENTING ILLNESS : MASS
DURATION
PAIN ABDOMEN
ABD DISTENSION

MENSTRUAL HISTORY :

MENOPAUSE YES NO

MARRIED YES NO NO.OF YEARS

OBSTETRIC HISTORY : NULLIPAROUS
PAROUS
NOC
LCB
OVULATION INDUCTION

CONTRACEPTION : YES NO
OCP
ST
OTHERS

PAST MEDICAL HISTORY :	DM	
	HT	
	IHD	
	NA	
SURGICAL HISTORY :	YES	NO
FAMILY HISTORY :	OVARIAN MALIGNANCY	
	ENDOMETRIAL CA	
	BREAST CA.	
GENERAL EXAMINATION :		
	HEIGHT:	
	WEIGHT:	
	BMI:	
O/E	ANAEMIA	
	PEDAL EDEMA	
	LYMPH NODES	
	BREAST	
	THYROID	
VITAL SIGNS	PR	BP
P/A	MASS	
	ASCITES	
	OTHERS	
P/S		
P/V		

USG ABDOMEN & PELVIS

S NO	USG FEATURES	PRESENT/ABSENT
1	MULTI SEPTATIONS	
2	SOLID COMPONENTS	
3	BILATERALITY	
4	ASCITES	
5	METASTATIC LESIONS	

ULTRASOUND SCORE :

CA 125 VALUE :

MENOPAUSAL SCORE :

RISK OF MALIGNANCY INDEX :

LAPAROTOMY FINDINGS

HPE

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

Telephone No : 044 25305301
Fax : 044 25363970

CERTIFICATE OF APPROVAL

To

Dr. V.S. Kiruthika Selvanayaki
PG in MD Obstetrics & Gynaecology
Madras Medical College, Chennai -3

Dear Dr. V.S. Kiruthika Selvanayaki

The Institutional Ethics committee of Madras Medical College, reviewed and discussed your application for approval of the proposal entitled "Study of Risk of Malignancy index in the preoperative evaluation of patients with ovarian tumour " No.03062012.

The following members of Ethics Committee were present in the meeting held on 27.06.2012 conducted at Madras Medical College, Chennai -3.

1.	Dr. S.K. Rajan. M.D.,FRCP.,DSc	-- Chairperson
2.	Prof. Pregna B. Dolia MD Director , Inst. of Biochemistry, MMC, Ch-3	-- Member Secretary
3.	Prof. K.M. Sudha MD Prof of Pharmacology ,MMC, Ch-3	-- Member
4.	Prof. C. Rajendiran, MD Director , Inst. of Internal Medicine, MMC, Ch-3	-- Member
5.	Prof. Karkuzhali MD Director i/c, Prof of Pathology, MMC, Ch-3	-- Member
6.	Thiru. Govindasamy BA BL	-- Lawyer

We approve the proposal to be conducted in its presented form.

Sd/ Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, and SAE occurring in the course of the study, any changes in the protocol and patients information / informed consent and asks to be provided a copy of the final report.

Member Secretary, Ethics Committee

CONSENT FORM

STUDY TITLE : STUDY OF RISK OF MALIGNANCY INDEX IN THE PREOPERATIVE EVALUATION OF PATIENTS WITH OVARIAN TUMOR

STUDY CENTRE : Institute of Obstetrics and Gynaecology,

Egmore,Chennai

Participant Name: Age: Sex: I.D.No.:

I confirm that I have understood the purpose of the above study. I have the opportunity to ask the questions and all my questions and doubts have been answered to my satisfaction.

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving any reason.

I understand that the investigator, regularity authorities and the ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if I withdraw from the study. I understand that my identity will not be revealed in any information released to third parties of published, unless as required under the law. I agree not to restrict the use of any results that arise from the study.

I hereby consent to participate in this study titled "STUDY OF RISK OF MALIGNANCY INDEX IN THE PREOPERATIVE EVALUATION OF PATIENTS WITH OVARIAN TUMOR"

Signature of Investigator:

Study Investigators Name:

Signature/thumb impression of patient

Date : Thanking you,

Place : Yours faithfully,

MASTER CHART

S. No	NAME	AGE	IP No	COMPLAINTS	MENSTRUAL HISTORY	PARITY	MENO SCORE	USG SCORE	CA 125 VALUE U/ml	RMI	HPE
1	SUMATHY	30	3487	PAIN ABD	REG	P1L1	1	1	27.4	27.4	SC
2	SARAL	38	4958	PAIN ABD	IRREG	P3L2/ST	1	1	18.9	18.9	SC
3	DESAMAL	31	3721	PAIN ABD	REG	P2L2	1	3	17.8	53.4	PSC
4	PAVUN	55	4399	PAIN ABD,DISTENTION	MNP-5	NG	3	1	51.73	155.19	MC
5	SUNDARI	50	2830	PAIN ABD	REG	P5L2	1	1	18.43	18.43	LUETINISED THECOMA
6	SHAMEMA	32	5317	PAIN ABD	REG	P2L2/ST	1	1	53.75	53.75	SC
7	KALAVATHY	43	32934	PAIN ABD, DISTENTION	IRREG	P2L2A1	1	1	15.38	15.38	MC
8	PACHAIAMMA	50	5600	PAIN ABD	MNP-2	P4L3/ST	3	1	23.6	70.8	SC
9	ANJALI	30	5059	PAIN ABD	REG	NG	1	3	13.01	39.03	DERMOID
10	KARPAGAM	33	5920	PAIN ABDOMEN	IRREG	P2L2/ST	1	1	10.41	10.41	FOLLICULAR CYST
11	VIJAYA	40	6135	PAIN ABDOMEN	REG	P3L2/ST	1	1	18.64	18.64	SC
12	PAIAZ	34	6669	PAIN ABDOMEN	REG	P2L2/ST	1	3	10.66	31.98	DERMOID
13	MALARVILI	35	6147	PAIN ABDOMEN	REG	P1A1	1	1	21.59	21.59	SC
14	CHELLAMAL	37	6961	PAIN ABDOMEN	REG	P2L1/ST	1	3	64.9	194.7	SC
15	BAKIYAM	56	1981	DISTENTION	MNP-13	NG	3	1	101.41	304.23	PSCC
16	RAJESWARI	60	6753	DISTENTION	MNP-5	P6L3	3	3	52.6	473.4	MC
17	PACHAIAMMA	45	6858	PMB	MNP-2	P3L3/ST	3	3	96.15	865.35	SC
18	MARY	45	7551	DISTENTION	REG	P3L3	1	1	10.3	10.3	CHYLOLYMPHATIC CYST
19	PREMA	40	7537	PAIN ABD	REG	P2L2	1	3	49.36	148.08	SC
20	SAVITRI	36	9070	PAIN ABD	REG	P2L2/ST	1	1	72.83	72.83	SC
21	POONGAVANAM	60	7182	DISTENTION	MNP-14	P6L4/ST	3	3	17.39	156.51	FIBROTHECOMA
22	AJIMA	31	3056	PAIN ABD,	REG	P2L2	1	1	18.62	18.62	SC
23	PUSPA	45	8504	PAIN ABD,	REG	P3L3	1	3	81.8	245.4	SC
24	MUNIYAMAL	60	4652	PAIN ABD,	MNP-9	P3L3	3	3	7.82	70.38	FIBROTHECOMA
25	VIJAYA	40	6743	PAIN ABD	REG	P3L2	1	1	87.19	87.19	SC
26	DHARANI	45	8430	PAIN ABD	REG	P2L2/ST	1	1	62.66	62.66	SC
27	DHANALAKSHMI	43	7747	DISTENTION	REG	P2L3/ST	1	3	59.37	178.11	SC
28	USHA	34	8683	PAIN ABD	REG	P3L2	1	3	16.16	48.48	DERMOID
29	BANUMATHY	60	8184	DISTENTION	MNP-12	P2L1/ST	3	3	84.91	764.19	SC
30	PARVATHY	55	10238	PAIN ABD, DISTENTION	MNP-6	NG	3	3	12.03	108.27	MCC
31	RAMAMANI	50	7745	DISTENTION	REG	P5L2	1	3	54.29	162.87	PSC
32	JAYALAKSMI	42	10336	PAIN ABD	REG	P3L3	1	1	29.56	29.56	SC
33	CHINNAPONNU	34	11996	PAIN ABD	REG	P2L2/ST	1	3	12.61	37.83	DERMOID
34	CHITRA	34	11983	DISTENTION	REG	P3L2/ST	1	1	83.27	83.27	MC
35	KALIAMMA	50	9078	PAIN ABD	IRREG	P5L5/ST	1	1	75.27	75.27	SC
36	VALARMATHY	35	9479	PAIN ABD	IRREG	P2L2	1	3	43.65	130.95	SC
37	JAYA	48	21324	PAIN ABD,	MNP-1	P2L2/ST	3	1	9.64	28.92	GCT
38	GOMATHY	40	10971	DISTENTION	IRREG	P2L2	1	3	38.36	115.08	MCC
39	CHINNAAMMAL	48	12140	DISTENTION	IRREG	P4L2/ST	1	3	731.84	2195.52	EAC
40	DEEPAVATHY	37	14220	PAIN ABD	REG	P2L2/ST	1	3	259.12	777.36	APST
41	RANI	36	13513	PAIN ABD	REG	P1L2	1	1	10.59	10.59	DERMOID
42	CHANDRAMA	66	12700	DISTENTION	MNP-16	P3L3/ST	3	3	79.31	713.79	EAC
43	KALAIVANI	54	13605	DISTENTION	MNP-3	P2L2/ST	3	3	826.72	7440.48	PSCC
44	JEBARANI	38	14930	PAIN ABD	REG	P2L2	1	1	8.51	8.51	DERMOID
45	MANONMANI	55	17721	DISTENTION	IRREG	P3L3	1	1	91.9	91.9	MCC
46	RUCMANI	35	14161	DISTENTION	REG	P1L1	1	1	103.89	103.89	SC
47	KALAIARASI	39	16361	DISTENTION	IRREG	P2L2	1	1	81.3	81.3	MC
48	GAJALAKSMI	49	13059	DISTENTION	IRREG	P2L1	1	3	285	855	PSCC
49	RABECA	50	14209	DISTENTION	MNP-4	P4L2/ST	3	3	35	315	PSCC
50	GAYATHRI	30	17664	PAIN ABD	REG	NG	1	1	9.48	9.48	DERMOID
51	KUMARI	47	15864	PAIN ABD	REG	P2L2	1	1	6.7	6.7	SIMPLE SEROUS CYST
52	MEERABAI	39	16840	PAIN ABD	REG	P2L2	1	1	8.48	8.48	DERMOID
53	PARVATHY	40	16000	DISTENTION	REG	P3L3/ST	1	1	13.48	13.48	MC
54	VALLI	42	17100	PAIN ABD	REG	P4L3/ST	1	1	49.13	49.13	SC
55	SULOCHANA	62	14469	DISTENTION	MNP-10	P6L5	3	1	46.28	138.84	SC
56	VANITHA	33	17999	PAIN ABD	REG	P1L1	1	3	29.26	87.78	DERMOID
57	KANNAMAL	32	16858	PAIN ABD	IRREG	P2L2/ST	1	3	37.1	111.3	SC
58	PUSPA	48	23026	DISTENTION	IRREG	P3L3/ST	1	1	57.4	57.4	SC
59	ANNAPOORANI	33	19219	PAIN ABD	REG	P2L2/ST	1	1	26.99	26.99	SC
60	VANAJA	32	20054	PAIN ABD	REG	P2L2/ST	1	1	8.35	8.35	SIMPLE SEROUS CYST
61	NATHIYA	35	19926	PAIN ABD	REG	P1A2	1	1	59.62	59.62	SC
62	VALARMATHY	36	19245	PAIN ABD	REG	P3L2/ST	1	1	6.99	6.99	SC
63	SARASWATHY	38	18468	PAIN ABD	REG	NG	1	1	9.15	9.15	DERMOID
64	JEYALAKSMI	34	19409	PAIN ABD;DISTENTION	REG	NG	1	3	82.76	248.28	SCC

65	SARASWATHY	31	21226	DISTENTION	IRREG	P2L2/ST	1	1	14.74	14.74	MC
66	MUTHUDEVI	55	19650	DISTENTION	MNP-6	P2L2/ST	3	1	20.13	60.39	MC
67	SAMPOORANAM	57	19568	DISTENTION	MNP-6	P3L2/ST	3	1	30.89	92.67	MC
68	SASIKALA	35	21989	PAIN ABD	REG	P2L2	1	1	63.79	63.79	SC
69	LILLY	32	21380	DISTENTION	IRREG	P2L2A1	1	3	173.56	520.68	APST
70	VENNILA	34	21149	PAIN ABD	REG	P2L1A2	1	1	62.59	62.59	SC
71	LAKSMI	31	22852	PAIN ABD	REG	P2L2/ST	1	1	47.81	47.81	SC
72	PREMA	30	23545	PAIN ABD	REG	P2L2/ST	1	3	10.17	30.51	DERMOID
73	KALAIVANI	32	23903	PAIN ABD	IRREG	NG	1	3	9.43	28.29	STRUMA OVARI
74	SATHYAVANI	30	23651	PAIN ABD	REG	P3L3/ST	1	1	16.86	16.86	SIMPLE SEROUS CYST
75	AMUDHA	33	24224	PAIN ABD	IRREG	P2L2/ST	1	1	71.48	71.48	SC
76	CHINNAPONNU	47	24214	DISTENTION	IRREG	P3L3/ST	1	3	156.8	470.4	PSCC
77	THARA	48	23885	DISTENTION	IRREG	P3L2	1	3	185.6	556.8	EAC
78	SELVI	41	22643	DISTENTION	MNP-1	P3L3	3	3	12.3	110.7	MC
79	AMUDHA	30	25784	PAIN ABD	IRREG	P2L2/ST	1	3	13.6	40.8	MC
80	JAYALAKSMI	38	26210	PAIN ABD	REG	P3L3/ST	1	1	15.55	15.55	DERMOID
81	ESTHER	70	22136	DISTENTION	MNP-22	P5L4	3	3	13.4	120.6	SC
82	ANJALI	45	27035	DISTENTION	IRREG	P3L3	1	3	14.62	43.86	MC
83	BHAVANI	34	28365	PAIN ABD	REG	P1L1	1	1	13.73	13.73	DERMOID
84	SARASWATHY	33	27965	PAIN ABD	REG	P2L2/ST	1	1	9.03	9.03	DERMOID
85	SUBAITHA	58	27585	DISTENTION	MNP-3	P3L3	3	1	72	216	MCC
86	MAHESWARI	32	30007	DISTENTION	REG	P2L2/ST	1	3	12.48	37.44	MC
87	SARASWATHY	34	31914	PAIN ABD	REG	P3L2/ST	1	1	39.71	39.71	SC
88	SUNDARI	31	30927	PAIN ABD	REG	P3L3	1	1	11.57	11.57	DERMOID
89	VIJAYA	35	32254	DISTENTION	IRREG	P2L2/ST	1	3	204.76	614.28	SCC
90	JENNIFER	32	34054	PAIN ABD	REG	P1L0	1	1	55.39	55.39	SC
91	CHANDRA	49	33381	PAIN ABD	REG	P4L4/ST	1	1	8.9	8.9	DERMOID
92	CHINATHAI	55	33078	PAIN ABD	MNP-3	P4L3/ST	3	1	10.63	31.89	DERMOID
93	KULLAMAL	70	33232	PAIN ABD	MNP-20	P5L5/ST	3	1	11.7	35.1	SC
94	PARIMALA	42	33395	DISTENTION	REG	P3L3/ST	1	1	49.59	49.59	SC
95	DEEPA	41	30377	PAIN ABD	REG	NG	1	3	380.1	1140.3	PSCC
96	VALLI	43	37264	PAIN ABD	REG	P3L2/ST	1	3	7.14	21.42	DERMOID
97	LAKSMI	60	35285	DISTENTION	MNP-6	NG	3	1	73.12	219.36	SC
98	AMUL	68	19205	PAIN ABD	MNP-10	P2L2/ST	3	3	6.99	62.91	MC
99	LOGANAYAKI	30	21141	PAIN ABD	IRREG	NG	1	1	11.19	11.19	SC
100	AMUDHA	51	21874	DISTENTION	MNP-2	NG	3	3	498.4	4485.6	SCC
101	DEVAKI	74	20683	DISTENTION	MNP-17	NG	3	3	44.23	398.07	SCC
102	LAKSMI	46	37811	PAIN	MNP-2	NG	3	1	236.53	709.59	EAC
103	SUMATHY	30	23487	PAIN ABD	REG	P1L1	1	1	29.47	29.47	SC
104	REVATHY	39	24958	PAIN ABD	IRREG	P3L2/ST	1	1	20.12	20.12	SC
105	BHARATHI	31	23532	PAIN ABD	REG	P2L2	1	3	24.22	72.66	PSC
106	SUDHA	55	14399	PAIN ABD,DISTENTION	MNP-5	NG	3	1	50.22	150.66	MC
107	NALINI	50	13732	PAIN ABD	REG	P5L2	1	1	20.74	20.74	SC
108	PALIAMMAL	30	25317	PAIN ABD	REG	P2L2/ST	1	1	57.36	57.36	SC
109	SELVI	45	12934	PAIN ABD, DISTENTION	IRREG	P2L2A1	1	1	14.72	14.72	MC
110	SASIKALA	53	15600	PAIN ABD	MNP-2	P4L3/ST	3	1	24.65	73.95	SC
111	ROOPAVATHY	32	15059	PAIN ABD	REG	NG	1	3	12.79	38.37	DERMOID
112	ARCHANA	30	25920	PAIN ABDOMEN	IRREG	P2L2/ST	1	1	10.41	10.41	corpus luteal cyst
113	SELVI	42	29563	PAIN ABDOMEN	REG	P3L2/ST	1	1	19.82	19.82	SC
114	GEETHA	31	16669	PAIN ABDOMEN	REG	P2L2/ST	1	3	9.39	28.17	DERMOID
115	SAROJA	33	26462	PAIN ABDOMEN	REG	P1A1	1	1	24.65	24.65	SC
116	SAMPOORNAM	36	26961	PAIN ABDOMEN	REG	P2L1/ST	1	3	63.86	191.58	SC
117	MADHUMITA	54	21981	DISTENTION	MNP-2	NG	3	1	121.8	365.4	PSCC
118	RAJESWARI	59	26753	DISTENTION	MNP-5	P6L3	3	3	48.32	434.88	malignant brenner tumor
119	VIJAYALAKSHMI	47	26858	PMB	MNP-2	P3L3/ST	3	3	90.45	814.05	SC
120	GAYATHRI	43	27551	DISTENTION	REG	P3L3	1	1	11.06	11.06	MC
121	TAMILARASI	45	27537	PAIN ABD	REG	P2L2	1	3	47.91	143.73	SC
122	ANDAL	35	29070	PAIN ABD	REG	P2L2/ST	1	1	75.98	75.98	SC
123	VIJAYAKAKSHMI	60	27182	DISTENTION	MNP-14	P6L4/ST	3	3	420.64	3785.76	PSCC
124	AMUL	31	33056	PAIN ABD,	REG	P2L2	1	1	21.86	21.86	SC
125	JOTHI	44	28504	PAIN ABD,	REG	P3L3	1	3	82.01	246.03	SC
126	VALLIAMMAL	62	30124	PAIN ABD,	MNP-9	P3L3	3	3	9.44	84.96	FIBROTHECOMA
127	SUSILA	41	26743	PAIN ABD	REG	P3L2	1	1	89.11	89.11	SC
128	BABY	43	28430	PAIN ABD	REG	P2L2/ST	1	1	60.74	60.74	SC
129	SASIKALA	45	27747	DISTENTION	REG	P2L3/ST	1	3	58.82	176.46	SC
130	THILAGA	32	28683	PAIN ABD	REG	P3L2	1	3	15.63	46.89	DERMOID
131	DESAMAL	62	28184	DISTENTION	MNP-12	P2L1/ST	3	3	84.63	761.67	SC
132	SUNDARI	56	20154	PAINABD, DISTENTION	MNP-6	NG	3	3	14.24	128.16	MCC
133	ANITHA	53	17745	DISTENTION	REG	P5L2	1	3	55.85	167.55	PSC
134	JEEVITHA	43	20143	PAIN ABD	REG	P3L3	1	1	28.99	28.99	SC
135	KALPANA	37	21996	PAIN ABD	REG	P2L2/ST	1	3	11.95	35.85	DERMOID

136	JAMUNA	49	29951	DISTENTION	MNP-2	NG	3	3	498.4	4485.6	SCC
137	LAKSMI	51	29078	PAIN ABD	IRREG	P5L5/ST	1	1	76.06	76.06	SC
138	MAHESWARI	32	19479	PAIN ABD	IRREG	P2L2	1	3	44.82	134.46	SC
139	MANJULA	49	21378	PAIN ABD,	MNP-1	P2L2/ST	3	1	10.9	32.7	GCT
140	RADHIKA	43	10959	DISTENTION	IRREG	P2L2	1	3	40.28	120.84	MCC
141	DEVI	49	12197	DISTENTION	IRREG	P4L2/ST	1	3	727.18	2181.54	EAC
142	HEMAVATHI	30	14631	PAIN ABD	REG	P2L2/ST	1	3	263.59	790.77	APST
143	CHITRA	34	23513	PAIN ABD	REG	P1L2	1	1	11.53	11.53	DERMOID
144	MARIAMMAL	67	12745	DISTENTION	MNP-16	P3L3/ST	3	3	81.43	732.87	EAC
145	MARUDAYE	52	13684	DISTENTION	MNP-3	P2L2/ST	3	3	832.64	7493.76	PSCC
146	ANUPRIYA	32	14984	PAIN ABD	REG	P2L2	1	1	9.62	9.62	DERMOID
147	POOVAYEE	56	17428	DISTENTION	MNP-2	P3L3	3	1	48.91	146.73	MCC
148	LAKSMI	34	14494	DISTENTION	REG	P3L3	1	1	101.78	101.78	SC
149	RENUGA	38	16364	DISTENTION	IRREG	P4L2/ST	1	1	83.74	83.74	MC
150	MAHESWARI	52	13073	DISTENTION	MNP-2	P1L1	3	3	284.86	2563.74	PSCC
151	NAGAMMAL	51	14251	DISTENTION	MNP-4	P4L2/ST	3	3	56.92	512.28	PSCC
152	SUMATHI	31	17693	PAIN ABD	REG	NG	1	1	9.72	9.72	DERMOID
153	LATHA	45	15827	PAIN ABD	REG	P2L2	1	1	10.67	10.67	SIMPLE SEROUS CYST
154	SARASWATHY	32	29643	PAIN ABD	IRREG	NG	1	1	45.75	45.75	SC
155	PARVATHY	43	16835	DISTENTION	REG	P3L3/ST	1	1	15.72	15.72	MC
156	JAMEELA	41	17638	PAIN ABD	REG	P4L3/ST	1	1	50.26	50.26	SC
157	SABEENA	63	14542	DISTENTION	MNP-10	P6L5	3	1	47.12	141.36	SC
158	VIJAYA	30	17954	PAIN ABD	REG	P1L1	1	3	26.98	80.94	DERMOID
159	SARITHA	33	23858	PAIN ABD	IRREG	P2L2/ST	1	3	38.52	115.56	SC
160	RAMAYE	50	27473	DISTENTION	IRREG	P3L3/ST	1	1	58.39	58.39	SC
161	AMMU	33	21921	PAIN ABD	REG	P2L2/ST	1	1	29.69	29.69	SC
162	JEYANTHI	35	25431	PAIN ABD	REG	P2L2/ST	1	1	13.24	13.24	SIMPLE SEROUS CYST
163	HEMALATHA	30	21926	PAIN ABD	REG	P1A2	1	1	60.41	60.41	SC
164	ANITHA	34	19263	PAIN ABD	REG	P3L2/ST	1	1	17.42	17.42	SC
165	SHENBAGAM	32	18424	PAIN ABD	REG	NG	1	1	7.22	7.22	DERMOID
166	PATTU	36	19449	PAIN ABD;DISTENTION	REG	NG	1	3	83.33	249.99	SCC
167	DEVI	35	21274	DISTENTION	IRREG	P2L2/ST	1	1	16.82	16.82	MC
168	ARUNAMMA	56	19627	DISTENTION	MNP-6	P2L2/ST	3	1	89.53	268.59	PSCC
169	AMARAVATHI	57	19524	DISTENTION	MNP-6	P3L2/ST	3	1	29.18	87.54	MC
170	NAGARANI	37	21934	PAIN ABD	REG	P2L2	1	1	63.99	63.99	SC
171	ANNIE	34	21346	DISTENTION	IRREG	P2L2A1	1	3	169.83	509.49	APST
172	KANMANI	30	21373	PAIN ABD	REG	P2L1A2	1	1	64.16	64.16	SC
173	VASANTHA	31	22825	PAIN ABD	REG	P2L2/ST	1	1	42.68	42.68	SC
174	ANITHA	34	23535	PAIN ABD	REG	P2L2/ST	1	3	9.35	28.05	DERMOID
175	UMA	53	23905	PAIN ABD	IRREG	NG	1	3	10.98	32.94	STRUMA OVARI
176	PUNITHA	32	23693	PAIN ABD	REG	P3L3/ST	1	1	15.83	15.83	SIMPLE SEROUS CYST
177	SANGEETHA	35	24252	PAIN ABD	IRREG	P2L2/ST	1	1	69.49	69.49	SC
178	SHALINI	45	24287	DISTENTION	IRREG	P3L3/ST	1	3	198.74	596.22	PSCC
179	SARGUNAM	49	23855	DISTENTION	MNP-1	P3L2	3	3	189.52	1705.68	EAC
180	KAVITHA	52	22697	DISTENTION	MNP-2	P3L3	3	3	14.73	132.57	MC
181	SUMITHRA	33	25372	PAIN ABD	IRREG	P2L2/ST	1	3	14.63	43.89	MC
182	VANITHA	37	26107	PAIN ABD	REG	P3L3/ST	1	1	14.75	14.75	DERMOID
183	RAJATHI	68	22197	DISTENTION	MNP-22	P5L4	3	3	16.83	151.47	SC
184	PORSELVI	45	27096	DISTENTION	IRREG	P3L3	1	3	19.42	58.26	MC
185	SUDHA	30	28332	PAIN ABD	REG	P1L1	1	1	12.62	12.62	DERMOID
186	SUMATHI	35	27949	PAIN ABD	REG	P2L2/ST	1	1	8.98	8.98	DERMOID
187	ANANDHI	57	27515	DISTENTION	MNP-3	P3L3	3	1	75.2	225.6	MCC
188	MEGALA	31	30105	DISTENTION	REG	P2L2/ST	1	3	14.05	42.15	MC
189	VASUKI	30	31938	PAIN ABD	REG	P3L2/ST	1	1	41.96	41.96	SC
190	NALINI	36	30904	PAIN ABD	REG	P3L3	1	1	11.53	11.53	DERMOID
191	PRABAVATHI	33	32178	DISTENTION	IRREG	P2L2/ST	1	3	285.19	855.57	SCC
192	PANDIAMMAL	32	34028	PAIN ABD	REG	P1L0	1	1	58.93	58.93	SC
193	GOWRI	45	33265	PAIN ABD	REG	P4L4/ST	1	1	10.41	10.41	DERMOID
194	BANUMATHY	57	33102	PAIN ABD	MNP-3	NG	3	1	94.62	283.86	PSCC
195	INDIRANI	68	33219	PAIN ABD	MNP-20	P5L5/ST	3	1	21.54	64.62	SC
196	SELVI	45	33358	DISTENTION	REG	P3L3/ST	1	1	59.42	59.42	SC
197	KOUSALYA	43	30357	PAIN ABD	REG	NG	1	3	417.88	1253.64	PSCC
198	USHA	41	37246	PAIN ABD	REG	P3L2/ST	1	3	8.42	25.26	DERMOID
199	LAKSMI	62	35252	DISTENTION	MNP-6	NG	3	1	71.83	215.49	SC
200	YASMIN	65	19272	PAIN ABD	MNP-10	P2L2/ST	3	3	11.21	100.89	MCC

KEY TO THE MASTER CHART

RMI	-	Risk of Malignancy Index
USG	-	Ultrasonogram
NG	-	NulliGravida
REG	-	Regular
IRREG	-	Irregular
PMB	-	Post Menopausal Bleeding
ABD	-	Abdomen
MNP	-	Menopause
P	-	Para
L	-	Live
A	-	Abortion
ST	-	Sterlised
HPE	-	Histopathological Examination
SC	-	Serous Cystadenoma
MC	-	Mucinous Cystadenoma
PSC	-	Papillary serous cystadenoma
PSCC	-	Papillary Serous Cystadeno Carcinoma
MCC	-	Mucinous Cystadeno Carcinoma
SCC	-	Serous Cystadeno Carcinoma
GCT	-	Granulosa Cell Tumor
EAC	-	Endometroid Adeno Carcinoma
APST	-	Atypical Proliferative Seromucinous tumor
MENO	-	Menopausal

ABBREVIATIONS

USG	Ultrasonagraphy
RMI	Risk of Malignancy Index
CA 125	Cancer Antigen 125
PI	Pulsality Index
ROC	Receiver Operating characteristic Curve
PPV	Positive Predictive Value
NPV	Negative Predictive Value
HCG	Human Chorionic Gonadotropin
GIT	Gastro Intestinal Tract
HPE	Histopathological Examination

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